American Journal of Public Health
and THE NATION'S HEALTH

Volume 35 July, 1945 Number 7

Rôle of β-Hemolytic Streptococci in Common Respiratory Disease*

Commission on Acute Respiratory Diseases,† Fort Bragg, North Carolina

DURING the past 2 years, studies dealing with the etiology of common respiratory diseases in the Army have been carried out by the Commission on Acute Respiratory Diseases. One aspect of this work has been an attempt to evaluate the rôle of β-hemolytic streptococci by clinical, cultural and serological methods.

In a previous investigation, a group of patients were selected for study because they presented one or more of the usual clinical criteria considered indicative of a "streptococcal sore throat" (acute tonsillitis).[1] Bacteriological confirmation by repeated throat cultures was not obtained, however, in many of these cases.

In a second investigation of this problem the patients were again selected on a clinical basis, but the only criterion employed for inclusion in the study was the presence of pharyngeal or tonsillar exudate.[2] Only one-half of these patients harbored β-hemolytic streptococci in their throats and only a quarter of the total number developed a significant increase in antibodies (antistreptolysin "O").

These results appeared to indicate that the clinical diagnosis of respiratory disease due to β-hemolytic streptococci might require not only bacteriological verification, but also—and perhaps more important—immunological confirmation. Support for this concept was obtained by the demonstration that cases of exudative pharyngitis which developed antistreptolysins differed in their clinical characteristics from those cases which failed to show an immunological response.

The present study was therefore designed to extend these observations to include all patients hospitalized for respiratory disease, as well as a sample of well soldiers of the population from which the patients came. Reëvaluation of the criteria for diagnosis was considered to be a necessary preliminary to the determination of the rôle of β-hemolytic streptococci in common respiratory disease.

---

* Presented by Elias Strauss, Captain, M.C., at a Joint Session of the Health Officers, Laboratory, and Epidemiology Sections of the American Public Health Association, at the Seventy-third Annual Meeting in New York, N. Y., October 5, 1944.

† Members and associates of the Commission on Acute Respiratory Diseases are: John H. Dingle, Major, MC, AUS, Director; Theodore J. Abernethy, Major, MC, AUS; George F. Badger, Captain, MC, AUS; Joseph W. Beard, M.D.; Norman L. Cressy, Major, MC, AUS; A. E. Feller, M.D.; Irving Gordon, M.D.; Alexander D. Langmuir, Captain, MC, AUS; Charles H. Rammelkamp, Jr., M.D.; Elias Strauss, Captain, MC, AUS; and Hugh Tatlock, 1st Lieutenant, MC, AUS.

METHODS

A military organization of approximately 12,000 men was selected for study. About 90 per cent of the men were recruits with less than 4 months of Army experience. During a 10 week period, from March 13 to May 19, 1944, all soldiers admitted to the hospital from this organization and found to have respiratory disease of any type, were studied. On admission to the hospital, a throat culture was taken and each man was examined for the presence of exudate on the pharynx or tonsils. Complete physical examinations were made and two additional throat cultures, on successive days, were taken on: (a) all patients with β-hemolytic streptococci in the first culture; (b) all patients with pharyngeal or tonsillar exudate; and (c) every fifth consecutive patient exhibiting neither pharyngeal exudate nor β-hemolytic streptococci on the first culture. Blood specimens on patients in the above three categories were obtained on admission to the hospital and again 3 and 6 weeks after the illness.

At fortnightly intervals during the study, throat cultures were obtained from well soldiers of three or four units in the organization, each unit consisting of approximately 250 soldiers. The men were assembled before morning mess and cultures obtained from alternate men in the line. Different units were cultured at each period. Approximately equal numbers of units with high and low incidence of respiratory disease were cultured. The selection of units for culturing was not based on knowledge of the prevalence or types of β-hemolytic streptococci in patients hospitalized from those units. Altogether throat cultures were obtained from each of 1,568 well soldiers—approximately 1 out of 7 in the entire organization.

Serological grouping of β-hemolytic streptococci was carried out by the capillary tube precipitin technic, using commercial sera and bacterial extracts prepared by Fuller's method.[3] Typing of Group A strains was done by the capillary tube precipitin method using bacterial extracts prepared by Lancefield's method.[4] Typing sera were available for 30 of the more usual types.*

Antistreptolysin "O" determinations were carried out by a modification of the method of Hodge and Swift.[5] The criterion for a significant rise in titer was stated in a previous publication.[2] Antistreptolysin was the only streptococcal antibody utilized in the study.

RESULTS

During the 10 week period, 857 patients with respiratory disease were admitted to the hospital from the study group. Approximately 90 per cent of these patients had acute febrile respiratory infections of short duration, the great majority of which were of undifferentiated types. Included also in this group were cases which were considered clinically as "streptococcal sore throat." Only 10 per cent of all the patients had either lobar pneumonia, primary atypical pneumonia, or acute exanthemata. One case of scarlet fever was detected during the period of observation. The streptococcal infections diagnosed in this study occurred sporadically and without evidence of epidemic concentration.

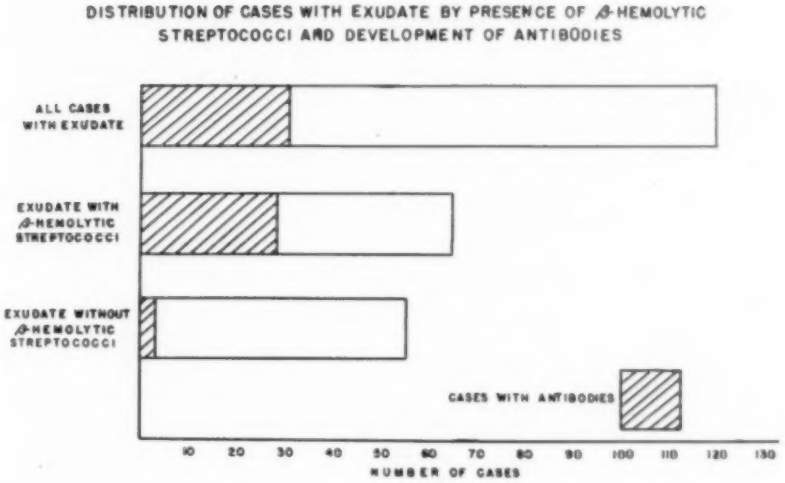
The results of clinical, bacteriological, and serological studies were analyzed in an attempt to establish criteria for the diagnosis of β-hemolytic streptococcal disease.

Pharyngeal or tonsillar exudate was selected as a clinical criterion since it

---

* Typing sera were available for types 1, 2, 3, 4, 5, 6, 9, 12, 13, 14, 15, 17, 18, 19, 23, 26, 28, 29, 30, 31, 32, 33, 36, 37, 39, 41, 43, 44, 45, and 46. We are grateful to Drs. Homer F. Swift and Rebecca C. Lancefield for generous supplies of typing sera, capillary tubes, and serum containers.

FIGURE 1


DISTRIBUTION OF CASES WITH EXUDATE BY PRESENCE OF β-HEMOLYTIC STREPTOCOCCI AND DEVELOPMENT OF ANTIBODIES
ALL CASES WITH EXUDATE
EXUDATE WITH β-HEMOLYTIC STREPTOCOCCI
EXUDATE WITHOUT β-HEMOLYTIC STREPTOCOCCI
CASES WITH ANTIBODIES
10 20 30 40 50 60 70 80 90 100 110 120 130
NUMBER OF CASES

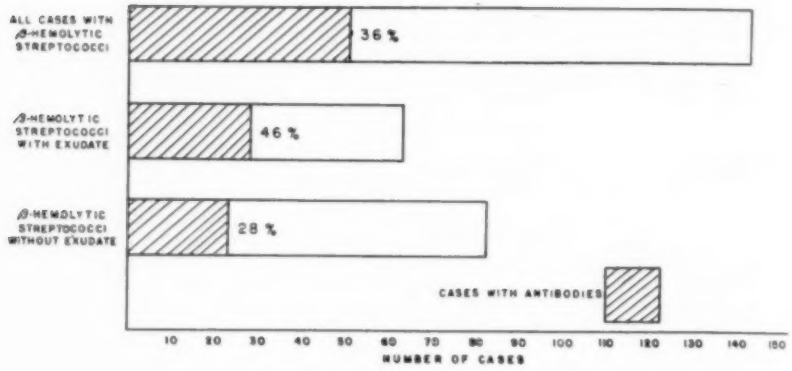
is a relatively objective finding which is commonly regarded as a characteristic feature of streptococcal infection of the throat. Exudate was found in the throats of 120 patients at the time of admission to the hospital (Figure 1). Half of these patients harbored β-hemolytic streptococci and half did not. Only one-fourth of all patients with exudate developed streptococcal antibodies. Almost all patients with exudate who developed antibodies also harbored β-hemolytic streptococci. One-half of the patients with both exudate and streptococci showed a diagnostic rise in serum antibodies. These findings paralelled closely the results obtained by the Commission in a similar study conducted the previous year.[2]

It was apparent that pharyngeal exudate alone was not indicative of a streptococcal illness since only one-quarter of such patients developed antibodies. With the view that clinical diagnosis might be more successful if other clinical criteria of "streptococcal sore throat" were employed, all cases were diagnosed clinically, on admission, on the basis of fever, edema of the pharynx, diffuse injection of the mucous membranes, and cervical lymphadenopathy as well as exudate. With these criteria only 44 cases were diagnosed as "streptococcal sore throat." A fourth of these cases, however, did not have β-hemolytic streptococci on cultures and more than half did not develop antibodies. Moreover 106 other patients—all of whom had β-hemolytic streptococci by culture, and a quarter of whom had antibodies—were thought to have non-streptococcal disease by clinical criteria. A number of patients whose throats did not present the appearance believed characteristic of streptococcal infection actually harbored these organisms and developed antibodies. A smaller number of patients who appeared clinically to have streptococcal disease had neither streptococci nor antibodies.

Just as clinical criteria, alone, were found inadequate to diagnose streptococcal infections, so also bacteriological diagnosis, alone, was insufficient. A combination of clinical and cultural findings was more satisfactory. One hundred and forty-three patients, or 17

FIGURE 2

DISTRIBUTION OF CASES WITH β-HEMOLYTIC STREPTOCOCCI BY PRESENCE OF EXUDATE AND DEVELOPMENT OF ANTIBODIES


ALL CASES WITH β-HEMOLYTIC STREPTOCOCCI
36 %
β-HEMOLYTIC STREPTOCOCCI WITH EXUDATE
46 %
β-HEMOLYTIC STREPTOCOCCI WITHOUT EXUDATE
28 %
CASES WITH ANTIBODIES
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
NUMBER OF CASES

per cent of all hospital patients, harbored β-hemolytic streptococci,* but only a third of them developed antibodies (Figure 2). Furthermore, in the absence of pharyngeal exudate only a quarter of cases with streptococci developed antistreptolysin. On the contrary, this antibody appeared in nearly half of cases with both pharyngeal exudate and streptococci.

Human illnesses with β-hemolytic streptococci are most frequently due to Group A strains. In the present study, approximately two-thirds of all patients with β-hemolytic streptococci harbored Group A strains (Figure 3). This figure shows that 90 per cent of patients who developed streptococcal antibodies harbored Group A strains.

* Based on the presence of β-hemolytic streptococci in any of three cultures.

FIGURE 3

DISTRIBUTION OF CASES WITH β-HEMOLYTIC STREPTOCOCCI BY GROUPS AND BY DEVELOPMENT OF ANTIBODIES

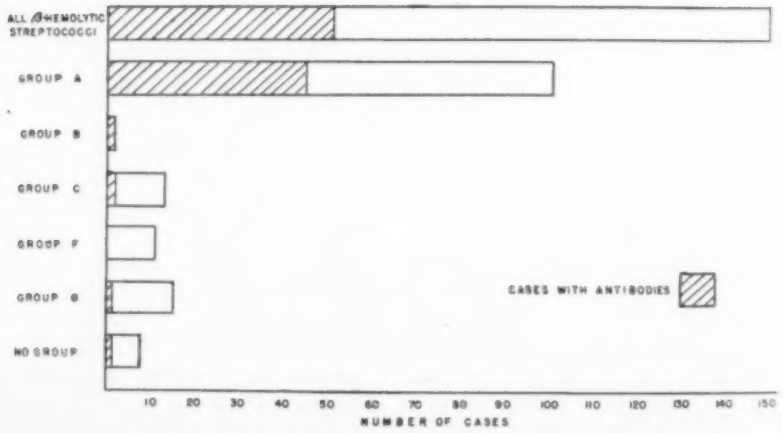
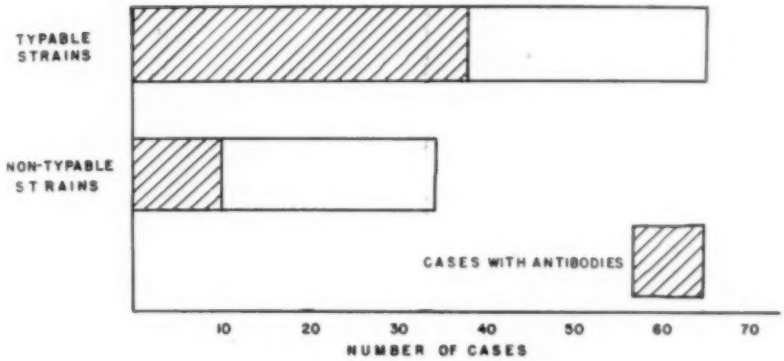


FIGURE 4

DEVELOPMENT OF ANTIBODIES IN CASES WITH TYPABLE AND NON-TYPABLE GROUP A β-HEMOLYTIC STREPTOCOCCI



Although a third of the streptococci isolated in the hospital patients were not Group A, only one-tenth of the cases with antistreptolysin were associated with these non-Group A strains. For practical purposes, therefore, streptococcal disease is chiefly a function of Group A.

Approximately 40 different serological types of Group A streptococci can be identified. As were mentioned previously, sera were available in this laboratory for the identification of 30 of the more common types. Type 19 was encountered most frequently and next, in descending order of frequency, types 3, 1, 6, 9, and 12. Nine other types were represented by only one or two cases each.

It was of interest to determine whether the presence of a typable strain was more likely to be associated with development of streptococcal antibodies than a non-typable strain. Figure 4 shows that 60 per cent of the cases with typable Group A strains developed antistreptolysin in contrast to 30 per cent of the cases with non-typable strains. The property of Group A strains which made them serologically type-specific appeared also to be associated with the ability of such strains to produce antistreptolysins, as is indicated by the fact that 75 per cent of patients who had both exudate in the pharynx and typable Group A strains of streptococci developed antibodies.

The above results suggested that β-hemolytic streptococci played little or no rôle in the clinical illness of those hospital patients who did not develop antibodies. A comparison was therefore made of the prevalence and distribution of β-hemolytic streptococci among well soldiers and hospital patients. Eight per cent of well soldiers and 13 per cent* of patients with respiratory disease harbored β-hemolytic streptococci (Figure 5). The difference in frequency between these two groups was accounted for almost entirely by the greater frequency of Group A strains in hospital patients. The right-hand column of Figure 5 indicates the frequency of β-hemolytic streptococci in hospital patients who

* Based on the first culture, for purposes of comparison with well soldiers.

did not develop antistreptolysins. In these patients the total frequency and distribution of strains by serological groups was almost identical with the findings obtained in well soldiers. It may also be noted that the difference in height of the middle and right-hand columns represented the total number of hospital cases with antistreptolysins. Approximately 6 per cent of all patients with respiratory disease developed streptococcal antibodies.

In Figure 6 is presented a similar comparison of well soldiers and hospitalized patients based on the presence of typable and non-typable Group A strains of β-hemolytic streptococci. Five per cent of well soldiers and 10 per cent of patients with respiratory disease had Group A strains. As in the previous figure, the frequency of Group A streptococci in patients who did not develop antibodies was almost identical with the frequency of carriers of Group A in well soldiers. The percentage of typable and non-typable strains closely paralleled the total frequency of all Group A strains. This similarity in frequency and distribution of β-hemolytic streptococci in well soldiers and in patients who did not develop antibodies is further confirmation of the conclusion that patients who did not have streptococcal antibodies did not have streptococcal disease.

FIGURE 6

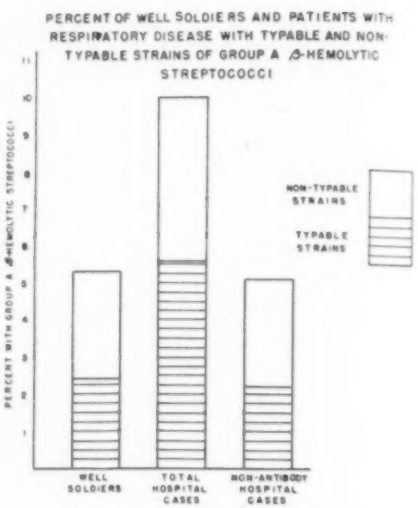
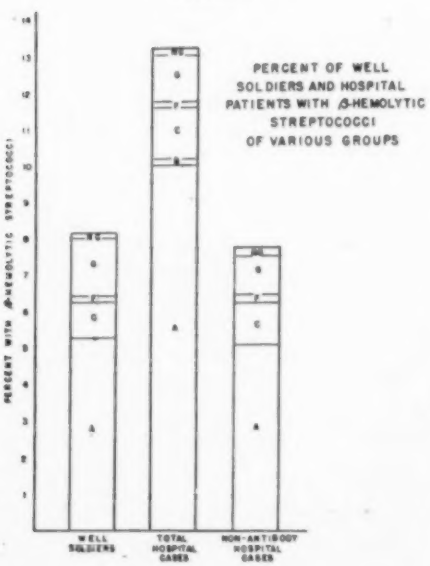

PERCENT OF WELL SOLDIERS AND PATIENTS WITH RESPIRATORY DISEASE WITH TYPABLE AND NON-TYPABLE STRAINS OF GROUP A β-HEMOLYTIC STREPTOCOCCI
PERCENT WITH GROUP A β-HEMOLYTIC STREPTOCOCCI
NON-TYPABLE STRAINS
TYPABLE STRAINS
WELL SOLDIERS
TOTAL HOSPITAL CASES
NON-ANTIBODY HOSPITAL CASES

FIGURE 5



DISCUSSION

The diagnosis of streptococcal disease rests on a combination of clinical, bacteriological, and immunological evidence. In this study, as well as in previous investigations, a clinical diagnosis alone was found to be inadequate. Only half of all cases with pharyngeal exudate had β-hemolytic streptococci and only a quarter of all cases with exudate had streptococcal antibodies. When the diagnosis was limited to patients with other "characteristic" clinical features, such as edema and injection of the mucous membranes, as well as exudate, it was more reliable. However, a number of cases which did not have streptococci by culture were erroneously considered "streptococcal sore throat" and some cases which had both streptococci by culture and serum

antibodies were not recognized clinically as streptococcal illnesses.

Bacteriological diagnosis was also inadequate since only a third of all cases with β-hemolytic streptococci had antibodies. Respiratory illnesses associated with the development of antistreptolysin were most likely to be associated with both pharyngeal exudate and Group A strains of streptococci of specific types.

Throughout this presentation major emphasis has been placed on the importance, in diagnosis, of immunological findings—specifically the detection of a rise in titer of antistreptolysin "O." The evidence for the diagnostic value of this test is substantial. Antistreptolysin has been demonstrated in more than 80 per cent of cases of scarlet fever [6] and in 72 per cent of cases of an epidemic of septic sore throat.[7] In a food-borne epidemic of septic sore throat due to Type 5 streptococci, studied by the Commission, antistreptolysins developed in 85 per cent of all hospitalized patients.[8] Other observations by the Commission have indicated that a rise in titer of antistreptolysin was most uncommon in the absence of clinical and cultural evidence of streptococcal illness. Well soldiers studied culturally and serologically rarely showed a rise in antibodies. In the present study of 180 patients with respiratory disease without β-hemolytic streptococci, only 9 had a rise in titer of antistreptolysin and at least 3 of these patients, on the basis of later bacteriological studies, were known to have developed hospital cross-infections with β-hemolytic streptococci. The evidence indicates, therefore, that this antibody is specific for β-hemolytic streptococcal infections. In all probability, at least 75 per cent of respiratory illnesses caused by Group A β-hemolytic streptococci are associated with a rise in antistreptolysin.

What, then, can be said of the rôle of streptococci in those respiratory illnesses in which streptococcal antibodies do not develop? It has been shown that the prevalence of streptococci which did not produce antibodies in hospital patients was almost identical with the prevalence of streptococci in well soldiers from the same population. The distribution of these organisms by serological groups and by typable and non-typable strains was also alike in well soldiers and hospital patients without antibodies. It seems justifiable to conclude, therefore, that the streptococci in both groups were merely carrier organisms and had no relationship to the respiratory illness which brought the patients to the hospital.

The present study was carried out in an area of low prevalence of β-hemolytic streptococci. During the period of observation no recognizable epidemics of streptococcal infection occurred. The experience at this post is not necessarily representative of the rôle of β-hemolytic streptococci in all geographic areas or in all military organizations. It is believed, however, that the criteria of illness due to β-hemolytic streptococci employed in this study are applicable also to epidemic conditions.

SUMMARY AND CONCLUSIONS

The diagnosis of streptococcal disease depends on the combination of clinical illness, bacteriological findings, and the development of specific antibodies. The presence of pharyngeal exudate alone was not a reliable guide to the presence of streptococcal illness since only half of such patients had streptococci by culture and only a fourth developed antibodies. Of all patients with respiratory disease who harbored β-hemolytic streptococci in their throats, only one-third had streptococcal infection; the other two-thirds were carriers of the organisms, and in these patients the streptococci present were of no etiological relationship to the respiratory disease. True strepto-

coccal disease occurred most frequently when pharyngeal exudate was present and typable Group A strains of β-hemolytic streptococci were found by culture.

In the military organization under study, which consisted chiefly of recruits, the prevalence of β-hemolytic streptococci among well soldiers was 8 per cent. The prevalence of Group A strains in the same population was 5 per cent. Cultural and serological results indicated that among all soldiers hospitalized for respiratory disease, only 6 per cent had immunological evidence of streptococcal infection, although more than twice this number harbored β-hemolytic streptococci in their throats.

REFERENCES

1. Dingle, J. H., Abernethy, T. J., Badger, G. F., Buddingh, G. J. Feller, A. E., Langmuir, A. D., Ruegsegger, J. M., and Wood, W. B. Primary Atypical Pneumonia, Etiology Unknown. *Am. J. Hyg.*, 39:67–128, 197–268, 269–336, 1944.

2. Commission on Acute Respiratory Diseases. Endemic Exudative Pharyngitis and Tonsillitis. Etiology and Clinical Characteristics. *J.A.M.A.*, 125:1163–1169, 1944.

3. Fuller, A. T. The Formamide Method for the Extraction of Polysaccharides from Haemolytic Streptococci. *Brit. J. Exper. Path.*, 19:130–139, 1938.

4. Swift, H. F., Wilson, A. T., and Lancefield, R. C. Typing Group A Hemolytic Streptococci by M Precipitin Reactions in Capillary Pipettes. *J. Exper. Med.*, 78:127–133, 1943.

5. Hodge, B. E., and Swift, H. F. *J. Exper. Med.*, 58:277, 1933.

6. Mote, J. R., and Jones, T. D. Studies of Hemolytic Streptococcal Antibodies in Control Groups, Rheumatic Fever, and Rheumatoid Arthritis. II. The Frequency of Antistreptolysin "O," Antifibrolysin, and Precipitating-Antibody Responses in Scarlet Fever, Hemolytic Streptococcal Infections, and Rheumatic Fever. *J. Immunol.*, 41:61–85, 1941.

7. Rantz, L. A. Group A Hemolytic Streptococcus Antibodies III. A Study of the Simultaneous Infection of a Large Number of Men by a Single Type. *Arch. Int. Med.*, 73:238–240. 1944.

8. Commission on Acute Respiratory Diseases. Unpublished Observations.

ACKNOWLEDGMENT

The Commission on Acute Respiratory Diseases takes pleasure in acknowledging the assistance of the technical staff of the laboratory: Pfc. Alexander Adler, T/5 David O. Foltz, Corp. Melvin H. Kaplan, T/5 Gerald J. Leuty, Barbara A. Mulliken, Dorothy C. Mickle, Walter A. Mickle, 2nd Lieutenant, Sn.C., A.U.S., Thomas J. Oliver, 1st Lieutenant, Sn.C., A.U.S., Ralph L. Robinson, 1st Lieutenant, Sn.C., A.U.S., and Irene A. Salmandra.

The Commission wishes to thank the following officers and their staffs at Fort Bragg for assistance in making this study possible: Major General D. C. Cubbison, Commanding General, Field Artillery Replacement Training Center; Brigadier General H. C. Coburn, Jr., M.C., Surgeon, Fort Bragg; Colonel G. D. Chunn, M.C., Commanding Officer, Regional Hospital; Lieutenant Colonel W. B. Daniels, M.C., Chief of Medical Service; Lieutenant Colonel H. O. Brown, M.C., Chief of Laboratory Service; Major R. L. Siegel, M.C., Surgeon, Field Artillery Replacement Training Center; Captain Samuel Cohen, M.C.; and 1st Lieutenant Morris A. Wessel, M.C.

NOTE: This investigation was supported through the Commission on Acute Respiratory Diseases, Board for the Investigation and Control of Influenza and Other Epidemic Diseases in the Army, Preventive Medicine Service, Office of the Surgeon General, United States Army, and by grants from the Commonwealth Fund, the W. K. Kellogg Foundation, the John and Mary R. Markle Foundation, and the International Health Division of the Rockefeller Foundation to the Board for the Investigation and Control of Influenza and Other Epidemic Diseases for the Commission on Acute Respiratory Diseases.

The Bacteria "Count"—An Estimate Capable of Accurate Interpretation*

JAMES D. BREW, PH.D., AND ROBERT S. BREED, PH.D., F.A.P.H.A.

University of Tennessee, Knoxville, Tenn., and New York State Experiment Station, Geneva, N. Y.

ABOUT every decade someone challenges the accuracy of the bacteria "count" in general, or the accuracy of one method of making determinations of the number of bacteria as compared to another method. An inquiry into the arguments presented invariably reveals the challenger to be either unfamiliar with the results of statistical studies made during the past thirty years, and/or prejudiced in favor of a particular laboratory method—usually that method which serves best under his own special conditions or training.

The interest of the authors in the methods by which bacteria counts were made, and in their interpretation, began independently during the first decade of this century. Since 1913 we have worked as associates in the same department, or coöperatively in different but related fields. During this period we have experienced almost every conceivable reaction, it would seem, to the merits and demerits of the various laboratory procedures devised to facilitate administrative efforts to control the quality of milk supplies.

Viewing these associations and experiences of more than three decades in retrospect, we are reminded of the several series of statistical studies made by different bacteriologists on the accuracy of bacterial count in general, beginning with one of the first studies ever made. This was supervised by Conn and reported in *Public Health Reports*.[1] The results of these and other similar studies have led to constructive changes in *Standard Methods for the Examination of Dairy Products*.

Just how much has actually been accomplished toward increased accuracy by our efforts to secure greater uniformity in laboratory methods has never been determined statistically. Those who have been close to the realities are inclined to feel that it is entirely within the realm of possibility that variabilities in duplicate counts, as made in different laboratories, are about as great in 1944 as they were in 1910 before there were any official standard methods. This statement is not intended as a criticism. Instead, it is made in the hope of focusing greater attention upon the fact that estimates of the numbers of bacteria or of bacterial colonies in milk, or in similar products, constitute a valuable index of the efficiency of certain procedures, even though these estimates may always be highly variable.

BACTERIAL CONTROL A HALF CENTURY AGO

Over fifty years ago Sedgwick and

* Presented before the Laboratory Section of the American Public Health Association at the Seventy-third Annual Meeting in New York, N. Y., October 5, 1944.

Batchelder reported that the bacterial content of the milk offered for sale in Boston was greater than when produced on the farm. This appears to have been the first report published in America on the number of bacteria present in a market milk supply.[2] The fact that these pioneers of over a half century ago used the term "estimation" in their title, suggests that they had no illusions regarding the true limitations of the agar plating procedure that they used. In the hands of many zealous individuals, however, the laboratory method by which "estimates" were first made, soon became accepted everywhere as the method by which bacteria "counts" were made. To count, irrefutably connotes greater accuracy than to estimate. Thus an innocent shift of terminology started a headlong race in the direction of a misapplication of the principle of making and applying bacterial estimates.

In 1893 came a second step which definitely implied extreme accuracy in numerical determinations of bacteria, namely the first attempt to develop a very low count milk, which became known to the public as certified milk. This movement initiated by Dr. Coit at Montclair, N. J., involved the use of laboratory methods for controlling the number of bacteria in milk. The first standards fixed were less than 20,000 per ml., but were soon dropped to 10,000. In the years that followed, individual producers and laboratory workers naturally yielded to the temptation to interpret such counts in terms of procedures in the dairy; whatever correlation there may be, however, is now recognized as being relatively insignificant.

This early effort to secure a low count in medically supervised raw milk was soon followed by efforts to fix bacterial limits for market milk supplies. The New York City Board of Health established a 1,000,000 count limit in 1900. The Boston City Board of Health made legal a 500,000 count limit in 1905. In 1908, New York City in a revised code established limits that were not only markedly lower but went so far as to imply sufficient accuracy and exactness in the making of counts to justify defining four grades of milk, the principal difference being the following bacteria count standards:

		Winter	*Summer*
1	Selected	50,000	100,000
2	Inspected	50,000	100,000
3	Guaranteed	30,000	30,000
4	Certified	10,000	10,000

These differences—initiated in official circles and having the force of law—we now know fall within the range of experimental error.

The downward trend in bacteria count limits finally assumed the proporitons of an avalanche approaching the ridiculous. During the first decade of the 20th century, the Bureau of Animal Industry of the U. S. Department of Agriculture devised a score card by which it was thought the quality of milk could be expressed mathematically. A "perfect" milk scored 100 per cent, distributed arbitrarily as follows: bacteria count 35, flavor and odor 25, visible dirt 10, fat 10, solids—not fat—10, titratable acidity 5, bottle and cap 5. A sample having an average bacteria count of 401 scored 0.5 per cent lower than one having 400 bacteria per ml.

Having in mind the realities involved in an honest interpretation of bacteria counts in establishing numerical limits, four principles should be kept in mind: (1) there is a limit below which production and distribution costs become excessive; (2) there is no significant relationship between the number of bacteria in milk and the factor of safety; (3) in general, the number of miscellaneous saprophytic organisms in milk has to be well up into the millions

per milliliter before there is any detectable influence upon the flavor; (4) the rank and file of consumers have never been greatly interested in the bacterial count of milk as such, but they are interested primarily in its food value, its palatability, the length of time the milk will keep, and in its safety.

BACTERIA COUNT LIMITS AND LOGARITHMIC REPRODUCTION

In fixing bacterial count limits, a most fundamental principle relative to the method of reproduction of bacteria seems to have been overlooked. This oversight has, in part at least, led those who formulate milk ordinances astray. One of the first things a student learns in the study of bacteriology is that bacteria reproduce by simple cell division—binary fission—roughly, about every 30 minutes. This means that they divide geometrically (1, 2, 4, 8, 16, 32, etc.) and not lineally, (1, 2, 3, 4, 5, 6, etc.). The difference at the end of 15 hours in the ultimate results of reproduction every half hour, starting with a single bacterial cell, will be better appreciated after studying the following table:

The Number Every 5 Hours by Lineal Reproduction	*The Number Every 5 Hours by Geometric Reproduction*
1	1
10	1,024
20	1,048,576
30	1,073,753,824

In any interpretation placed on the number of bacteria that may be expected in milk or any other substance, or in any attempt to fix numerical limits, the theoretical rate and numbers indicated in Column 2 should be the guide.

EXPERIMENTAL ERROR IN DUPLICATE DETERMINATIONS

A combination of factors is responsible for the normally high experimental error in duplicate bacteria counts. This may be large even when two plates are prepared from the same dilution bottle by the same person. The error becomes greater (1) as the counts are made from dilutions prepared independently from separate samples, (2) as the counts are made by different individuals from duplicate samples, and (3) as the counts are made from duplicate samples by different individuals working in different laboratories.* In practice, these experimental errors normally range as high as 100 per cent to several hundred per cent, and occasionally several thousand per cent. Hence, *the importance of making a series of counts* before any interpretation is attempted becomes clear.

IMPORTANCE OF KNOWING TYPES OF BACTERIA PRESENT

This factor cannot be stressed too strongly. It is one of the most important elements in an accurate appraisal of any bacterial situation—more important than the "count" alone, in fact.

In *Standard Methods* it is pointed out that a laboratory should carry out controls whenever there is reason to suspect the presence of bacteria that do not develop on agar plates. Yet, as Dr. Black has shown in his report,[3] this requirement is almost universally ignored. Much energy is being spent in determining whether certain harmless thermoduric bacteria in a given raw milk will be killed during pasteurization. Very few persons, however, examine pasteurized milk to determine whether thermophilic bacteria are present, and practically everyone ignores the possibility of the growth of low temperature bacteria in cream held in cold storage for a few days.

Just why certain harmless saprophytic

* See, for example, a notable study made by the New York State Department of Health under the direction of W. D. Tiedeman (*22nd Annual Report of the International Association of Dairy and Milk Inspectors*, 1934, pp. 225–236).

bacteria, which will grow at 37° C., are held to be so significant, while other saprophytic bacteria which grow readily at higher and at lower temperatures should be ignored, is hard to understand. The presence of these high and low temperature bacteria is just as indicative of faulty handling as is the presence of thermoduric bacteria.

The great advantage of the microscope soon becomes evident when a control over these high and low temperature bacteria is established. With the microscope it is possible to determine the types of bacteria present in either raw or pasteurized milk. Likewise it is possible quickly to detect milk excessively high in leucocytes. A person with the proper background can interpret findings with a high degree of accuracy within an hour's time, and in a way that is much more satisfactory than examinations that are limited to a counting of colonies of bacteria that happen to be adapted to growth on agar plates incubated 2 days at 37° C.

COMPARISONS OF THE ACCURACY OF PLATE AND DIRECT MICROSCOPIC COUNTS

It would be a waste of time to develop a detailed discussion of the comparative accuracy of "counts" made by the plate and microscopic methods. As has been explained many times in the literature, the true mathematical accuracy of the counts obtained by the two methods can never be determined until someone devises a method by which the actual number of bacteria in a given volume of milk can be counted. Only in this way can we obtain a figure for comparison with the figures obtained by estimating numbers.

The counts obtained by the two methods are not exactly comparable. The plate count represents the groups of bacteria that grow on a given agar at a given temperature as they exist in the dilution water rather than as they exist in the milk sample. Too frequently the plate count is reported, and even more frequently treated, as if it were a count of individual bacteria.

This matter can be made clearer by a simple comparison with a count of objects that are larger than bacteria. In the case of the agar plate count, it is as if a count were made of the number of flocks of sheep and goats in each of the states of the Union and then the results obtained regarded as a count of the number of individual sheep. As a matter of fact, the number of flocks would bear no constant relationship to the total number of sheep, as the size of flocks in such states as New Hampshire and Vermont would be much smaller than the size of the flocks in Wyoming and Utah. Likewise, forgetting the goats that are almost as numerous as the sheep in some states is in line with the actions of those who forget the high and low temperature as they incubate plates at a single temperature (32 or 37° C.).

The recognition of the fact that plate counts and microscopic counts are very different in nature does not prevent the satisfactory use of either count, provided the size of possible errors is kept in mind. Some studies have been made in an effort to show the number of bacteria present in each clump under average conditions. Robertson [4] showed that the *most frequent ratio* between the agar plate count incubated at 37° C. for 2 days, and the microscopic count of individuals in the samples of milk that he examined was 1:4. This *ratio* was lowered to 1:2.5 when the plates were incubated at 21° for 5 days, and was lowered to 1:2 when incubated at 21° for 5 days with 2 additional days at 37° C. Unfortunately, these most frequent ratios did not occur in more than 15 to 20 per cent of the samples, and the observed individual ratios pointedly illustrate the fact that it is unwise to attempt to interpret the

agar plate count in terms of a direct microscopic count of individual bacteria.

CONCLUSIONS

It is wise to use agar plate and microscopic estimates conservatively in view of the known more or less uncontrollable variabilities. We should not be deceived when results secured by either method are reported in exact figures. These estimates may be used safely in judging whether a milk is in "acceptable," "satisfactory," or "unsatisfactory," condition. But when we attempt to draw fine distinctions as though reflecting actual differences in quality, we are making a use of these methods of estimating numbers that is not conservative and is not justified.

Wherever the agar plate method is used, it should be remembered that many of the high and low temperature organisms that occur so frequently in pasteurized milk and cream may not grow at 37° C., and that some fastidious organisms will not grow well on even the new standard agar. While some dead bacteria may appear in stainable condition in making microscopic estimates, it should be remembered that dead bacteria are just as significant as the living in interpreting the past history of a given sample of milk. No high quality market milk or cream contains an excessive number of bacteria, either living or dead.

Discussion—Robert S. Breed, Ph.D.

Dr. Brew and I greatly enjoyed preparing this joint paper. It has a certain historical significance as it was at the Richmond, Virginia, meeting of the American Public Health Association, thirty-five years ago, that I had the pleasure of presenting a paper describing a new and direct method of counting leucocytes in milk. This method had been developed the previous summer while I was working with Professor S. C. Prescott in his Biochemical Laboratory on Boylston Street in Boston.[5] Later I found that the same technic could be used for counting bacteria in milk and reported this fact in 1911.[6]

When Dr. Brew and I became associated at the Geneva Experiment Station in 1913, I found that Dr. Brew had already completed making an extensive series of comparative counts of bacteria in milk, using both the agar plate and the direct microscope technics. This report was published by Dr. Brew thirty years ago.[7]

The pioneer work of two other individuals should be mentioned in this connection. Mr. N. E. Lazarus, now of Buffalo, New York, became interested in the direct microscopic technic very soon after it was first developed. He was bacteriologist at the time for the Mutual-McDermott Milk Company of New York City. In the fall of 1915, the New York City Department of Health used the policy of degrading A milk plants to a grade B status when bacterial counts became excessive. When his company met this difficulty at a plant in northern New York with about 350 producers, Mr. Lazarus was sent to the plant to see what could be done toward correcting the high bacterial counts obtained from this plant. He reported back the next day that he was sending milk to the city that would meet the standards required for bacterial count. Three days later he received a long-distance telephone call from his manager that the Board of Health was looking for preservatives in the milk as they did not believe anyone could correct the quality of such a supply in so short a time. Mr. Lazarus then invited the Health Department group to come to the plant and see for themselves what he had done. This

group arrived the next morning. To paraphrase a famous saying: They came, they saw, and were satisfied. From that time on, the New York City official group has believed in the value of this technic. Dr. W. H. Park, with Dr. H. W. Conn and others, approved the recognition of the microscopic technic as a standard method of the American Public Health Association in 1915 before I became a member of the Standard Methods Committee for Milk Analysis in 1916. This technic has been used in various ways in the milk control program of New York City, and today holds a firm place for use in checking the quality of raw milk supplies, both by the industry and by the city inspection service.

At about the same time (1916) Professor J. M. Frayer, now of the Vermont Agricultural Experiment Station staff, was bacteriologist for the Lyndonville Creamery Association of Vermont. During this year the Bureau of Chemistry of the U. S. Department of Agriculture undertook to enforce the provisions of the Federal Food and Drug Act governing the quality of milk imported from Canada. When Prof. Frayer, who had been taught the direct microscopic technic by Dr. G. C. Supplee at Cornell the previous year, asked permission for his company to ship milk across the border the day after he arrived at a Canadian plant, the federal authorities objected on the ground that he could not be sure of the quality of the milk. However, they agreed to a trial shipment, further shipments to be held until they could count their agar plates 48 hours later. When they found Prof. Frayer had made a proper selection of the good quality milk, they allowed further shipments when quality was checked before shipment by microscopic examinations.

The federal group soon after became interested in the microscopic technic and attempted to use it to examine pasteurized milk to determine the number of bacteria present in the milk *before pasteurization* on the theory that the bacteria killed during pasteurization would remain in stainable condition. When this was found *not* to be true, the matter of using the microscope for a control of the bacterial quality of pasteurized milk was dropped. However, the years have accumulated evidence that the bacteria found in stainable condition in pasteurized milk are generally living (though frequently incapable of growing on standard agar incubated at 37° C.), and the microscope is now finding its place in control of the quality of pasteurized as well as raw milk.

Even though the use of the microscope for estimating numbers of bacteria is an older procedure (Leeuwenhoek so used it in 1683) than the agar plate technic, it will be many years before those who have used the later technic for judging milk quality fully realize that there is no significant difference in the quality of two bottles of pasteurized milk, one of which gives a standard plate count of 6,000, and the other a standard plate count of 26,000. Yet such is the case.

REFERENCES

1. Conn, H. W. Standards for Determining the Purity of Milk. *Pub. Health Rep.*, 30:2349–2395, 1915.

2. Sedgwick, W. T., and Batchelder, J. L., Jr. A Bacteriological Examination of the Boston Milk Supply. *Boston M. & S. J.*, 126:25, 1892.

3. Black, Luther A. Surveys of Milk Laboratories in War Areas in the U. S. *Pub. Health Rep.*, 58, 44: 1605–1623 (Oct. 29); 45:1641–1658 (Nov. 5); and 46:1681–1689 (Nov. 12), 1943.

4. Robertson, A. H. The Relation Between Bacterial Counts from Milk as Obtained by Microscopic and Plate Methods. *Tech. Bull. 86.* N. Y. State Exper. Sta., Sept., 1921.

5. Prescott, S. C., and Breed, R. S. The Determination of the Number of Body Cells in Milk by a Direct Method. *Am. J. Pub. Hyg.*, 20, 3:663 (Aug.), 1910.

6. Breed, R. S. The Determination of the Number of Bacteria in Milk by Direct Microscopical Examination. *Centralbl. f. Bakt.* II. Abt. 30:337–340, 1911.

7. Brew, James D. A Comparison of the Microscopical Method and the Plate Method of Counting Bacteria in Milk. *Bull. 373*, N. Y. State Exper. Sta., Feb., 1914.

World War I and Tuberculosis*

A Statistical Summary and Review

GODIAS J. DROLET, F.A.P.H.A.†

Statistician, New York Tuberculosis and Health Association, New York, N. Y.

WORLD War I lasted nearly five years, from the middle of 1914 to November, 1918. The extent to which tuberculosis spread at that time involved countries ‡ all over the globe and will never be fully measured. Neutral nations as well as those at war suffered!

It is unnecessary to remind an audience of epidemiologists, health officers, and registrars that the machinery for the registration of deaths and their causes simply disappeared in areas where fighting was going on, especially at a time when even national governments were forced into exile. After all, in peacetime the current registration of cases of tuberculosis is required in but few countries in this world. However, there are at hand certain sample records which give an idea of the additional suffering caused by tuberculosis during World War I, especially during the five years of 1914 to 1918.

For the purpose I have assembled, I am afraid a bit inadequately but still significantly, such mortality figures as could be found readily for 24 different countries and 34 large cities scattered over the globe. Onto the years 1914 to 1918, I have added for comparative purposes similar data for the pre-war year 1913 and the two post-war years of 1919 and 1920 (Tables 1 and 2).

Almost everywhere the tuberculosis death rate was highest in 1918 when influenza added its woes and hastened the deaths of many victims of tuberculosis as well as those of others. But for the purpose of ascertaining the progress of tuberculosis during the war years it is perhaps fairer to feature the rates of 1917 against those of 1913 and 1920 (Tables 3 and 4).

IN AMERICA

In the United States, in 1913, our tuberculosis death rate in the light of nowadays was still high, 148 per 100,000 population. The effect of war conditions merely delayed the decline which had been going on for years. Still, the rate went up to 150 in 1918 and in the post-war year 1920 quickly fell to 114. Even then, the deaths in this country in 1917 alone were probably between 18,000 and 20,000 more than they otherwise would have been.

We must also recall that the mortality record from tuberculosis in any one year represents never more than 40 or 50 per cent of all who are attacked by the disease, and that other victims follow in subsequent years among those infected previously.[1]

---

* Presented at a Joint Session of the Health Officers, Vital Statistics and Epidemiology Sections of the American Public Health Association at the Seventy-third Annual Meeting in New York, N. Y., October 5, 1944.

† Former statistician, Commission for the Prevention of Tuberculosis in France.

‡ In World War I, the Central Powers were Germany, Austria-Hungary, Bulgaria and Turkey; the principal Allied Nations were France, Italy, Russia, England and the United States; neutral countries, closely affected, included the Netherlands, Denmark, Norway and Sweden.

TABLE 1

World War I and Tuberculosis

Annual Mortality from 1913 to 1920 in 24 Different Countries*

Country	Population in/about 1920	Rate per Each 100,000 Inhabitants							
		1913	1914	1915	1916	1917	1918	1919	1920
United States	106,543,031	148	147	146	142	147	150	126	114
Ireland	4,480,000	214	207	220	214	221	218	194	170
Scotland	4,882,497	169	162	164	160	159	160	131	124
England, Wales	37,524,000	135	136	°151	°153	°162	°169	°128	°113
Belgium	7,462,000	118	124	131	149	211	245	144	114
France‡	35,970,000	212	216	218	214	211	243	209	185
Italy‡	36,250,000	143	144	158	166	175	209	173	160
Spain	21,347,000	152	149	160	161	172	204	181	180
Bavaria	7,100,000	177	174	180	194	200	204	186	151
Germany	59,857,283	143	142	148	162	206	229	212	154
Austria‡	30,104,000	259	256	322	387	432	403	360	284
Hungary‡	20,792,709	328	308	354	366	383	410	388	348
Czecho-Slovakia	13,595,816	296	290	325	331	331	359	314	261
Finland†	3,364,000	261	259	269	276	261	258	216	219
Norway	2,649,000	221	221	210	232	212	201	190	190
Sweden	5,904,000	185	193	204	206	195	176	164	162
Denmark	3,218,000	126	131	125	138	158	128	114	113
Netherlands	6,965,700	142	140	144	167	182	203	174	147
Switzerland	3,880,000	202	195	190	191	207	201	200	180
Japan	55,963,053	208	211	213	221	223	248	236	224
Philippines	10,607,872	228	237	239	246	250	315	313	275
Australia	5,412,318	81	75	73	75	66	68	75	67
New Zealand	1,192,620	76	67	63	67	69	75	67	71
South Africa¶	1,519,488	51	45	44	46	50	46	45	46

* All forms of tuberculosis. † Pulmonary tuberculosis. ° Civilian population. ¶ White population. ‡ France, 77 non-invaded departments. Italy, 1917–1920, non-invaded communes. Austria, pre-war, 1913–1918; population, in 1911, 28,649,449; in 1920, 6,476,000. Hungary, pre-war, 1913–1918; population, in 1910, 20,792,709; in 1920, 8,054,000. Compiled from *Epidemiological Reports*, Health Section, League of Nations; Annuaire Statistique, France; Official Yearbooks of certain countries listed, etc.

NOTE: Because of the difficulty of estimating population in wartimes, tuberculosis death rates mentioned by some authorities differ for certain places—though this does not alter the number of deaths themselves. In cases where original sources of information were available they have been given preference. Thus, instead of quoting rates from the reports of the League of Nations, there has been utilized for Vienna those of its Bureau of Statistics; similarly for France and Paris, the figures of the Annuaire Statistique de France; for Hungary, the data received directly from the State Tuberculosis Commission.

We have some measure in the records of the Veterans Administration of the incidence of tuberculosis at that time, and its problem thereafter, among members of the armed forces during World War I. Only last spring, in Chicago, at the annual meeting of the National Tuberculosis Association, Colonel Wolford,[2] Assistant Medical Director of the Veterans Administration, reported that "By June 30, 1922—less than four years after the armistice—compensation for 'service connected' tuberculosis had been granted to a total of 36,600 living veterans who had served in that conflict."

In 1928, ten years after the first World War, of 6,045 tuberculous veterans in hospitals, 58 per cent were "service connected." And these figures relate only to the 4,750,000 men in military service during World War I and not to the 95,000,000 civilians.

Spillman[3] brought out recently that tuberculosis during World War I has cost for the veterans alone approximately $960,000,000 to date in compensation, vocational training, insurance, and hospitalization.

In the United States Navy and Marine Corps, according to Smiley and Raskin,[4] the "original admission rate" to the sick list because of tuberculosis was 372 per 100,000 men in 1915, and rose to 476 in 1918.

In Canada, Miller[5] reports, in a study published in 1939, that of

TABLE 2

World War I and Tuberculosis

Annual Mortality from 1913 to 1920 in 34 Large Cities*

City	Population in/about 1920	Rate per Each 100,000 Inhabitants							
		1913	1914	1915	1916	1917	1918	1919	1920
New York	5,683,765	199	200	196	182	188	184	152	126
Montreal	603,703	215	225	200	190	195	214	192	182
Rio-de-Janeiro	1,170,660	417	438	434	407	392	444	388	394
Sao Paulo	579,000	117	126	126	109	124	124	116	110
Sydney	955,900	82	69	62	65	55	59	75	71
Melbourne	816,800	110	109	94	104	101	101	104	98
Tokyo	2,437,503	427	409	395	397	381	430	417	352
Bombay	1,200,473	219	192	174	194	216	256	283	187
Belfast	393,000	300	282	262	269	305	319	281	243
Edinburgh	420,000	159	162	148	140	151	124	118	102
London	4,484,523	165	177	199	189	211	214	145	129
Lille	201,000	306	...	...	559	402	540	263	181
Paris	2,904,635	385	396	376	361	358	339	279	272
Madrid	751,352	301	314	327	320	337	390	384	392
Rome	691,314	224	228	241	259	281	392	301	238
Helsinski	197,848	315	263	288	300	245	263	208	204
Oslo	258,403	228	219	214	216	194	201	189	209
Stockholm	422,042	260	273	273	249	231	235	240	209
Copenhagen	561,000	142	149	143	179	197	151	128	118
Amsterdam	647,427	154	160	152	189	203	232	196	157
The Hague	353,286	147†	...	135	138	167	187	155	123
Rotterdam	510,538	147†	...	155	189	211	252	211	169
Brussels‡	775,039	198‡					252¶		
Berlin	3,803,770	185	194	207	222	323	320	273	176
Vienna	1,841,326	323	315	362	407	479	476	527	405
Budapest	1,184,616	361	327	397	515	639	642	483	448
Prague	659,251	304	303	338	389	409	397	320	253
Leningrad+	1,962,443	286	299	306	319	331	355	438	504
Moscow	1,120,000	266	249	236	244	232	202	275	397
Kief	366,000	...	...	...	...	...	364	461	688
Warsaw	931,176	306	312	410	600	974	738	593	337
Lodz	447,714	...	...	...	...	1,164	775	604	...
Lwow	217,793	480	586	741	622	665	635	...	...
Cracow	178,386	487	473	480	750	908	845	616	...

* All forms of tuberculosis. † Average annual rate, four year period 1911–1914. ‡ Five year period 1911–1915; ¶ 1916–1920. + Pulmonary tuberculosis. Compiled generally from *Epidemiological Reports*, Health Section, League of Nations, or from official reports of cities listed.

Canadian pensioners of World War I —when 620,000 men enlisted—eventually 8,500 were pensioned for tuberculosis and 3,000 died from the disease. Miller further remarked that for every 100 men killed in action 6 died from tuberculosis; and, for every 100 pensioned for wounds, 25 were pensioned for tuberculosis.

IN EUROPE

In the United Kingdom, World War I not only interrupted the previous decline in the tuberculosis death rate but sent it up each year until 1919. The submarine warfare greatly reduced food supplies, especially in the great cities of England, Scotland, and even of Ireland (Chart 1).

Whereas, in the pre-war year 1913, in England and Wales the death rate was 135 per 100,000, it rose to 162 in 1917 and to 169 in 1918. In London, in 1917 the rate was 211 and in Belfast 305. Taking as a conservative basis the tuberculosis death rate in 1914 of 136 in England and Wales and applying it to the population for the years 1915, 1916, 1917, and 1918, we find that instead of the 200,833 deaths which might be expected they actually numbered 21,327 more, or 222,160. In the single year of 1918 the number of new cases of tuberculosis notified or

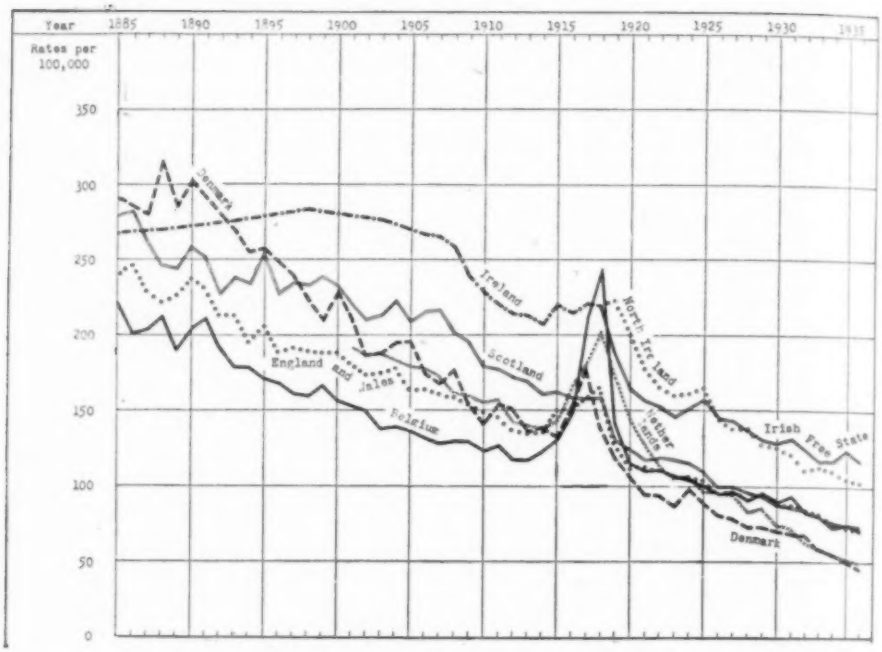


CHART 1—Tuberculosis Death Rates in Great Britain, Belgium, the Netherlands, and Denmark during Fifty Year Period 1885–1935

Based on data exclusively from *Epidemiological Reports*, Health Section, League of Nations

registered was 90,573. The war increase affected mainly the adult population 15 to 45 years of age, men more than women. Among females, the greatest increase was present in the age group 15 to 35.

In both Scotland and Ireland the effect of conditions during World War I was manifested in the maintenance of high tuberculosis rates rather than in an increase.

In France, even before World War I, high tuberculosis death rates were already prevailing. A material rise was recorded, at least in the non-invaded sections, only in 1918 when the rate was 243 per 100,000 as compared with 212 in 1913. France has always been successful in providing for most of its food requirements. We should, however, note the high tuberculosis death rate of 358 in Paris during the year 1917 when, for instance, in New York City ours was 188, or 170 points lower.

Occupied northern France, however, suffered definitely. And, while little information is available as to the tuberculosis situation then existing, we know that in the industrial city of Lille the tuberculosis death rate rose to 402 in 1917 and 540 in 1918. How abnormal this was can be realized when we notice that in 1920 the rate fell to 181.

During the four years from 1915 to 1918, in 77 departments of France tuberculosis alone caused 291,412 deaths.

Italy, which previous to World War I had a comparatively favorable tuberculosis death rate, saw its northern communes invaded by Austro-Hungarian forces and suffered a definite increase of tuberculosis. As against a death rate of 143 in 1913, the rate

rose to 175 in 1917 and 209 in 1918. And, whereas in most countries the post-war rate of 1920 was lower than the pre-war rate of 1913, here it remained at 160 compared with 143. In Rome, tuberculosis was rife and the rate in 1918 ran up to 392, or 75 per cent higher than only six years previously.

Altogether in Italy, during the four year period 1915–1918, tuberculosis deaths in the non-invaded sections totalled 254,469, or 47,095 more than would have been expected had the 1914 rate merely continued to prevail.

In war-swept Belgium, the tuberculosis death rate in 1918 was double that of 1914, 245 as compared with 124. And but for the emergency relief organized at that time conditions would have been worse. Here, even in the rural sections, the tuberculosis rates were as high as those in crowded large cities, the rate in Brussels, 252, being only 7 points higher than that of the country as a whole.

CENTRAL POWERS

The record among the principal Central Powers in World War I—Germany, Austria-Hungary, excepting Bulgaria and Turkey for which there are no figures available here—will always remain a classic instance of tuberculosis and war conditions, especially when there are marked deficiencies of food (Chart 2). In the pre-war year of 1913, Germany was experiencing one of its lowest tuberculosis death rates in a decade. The

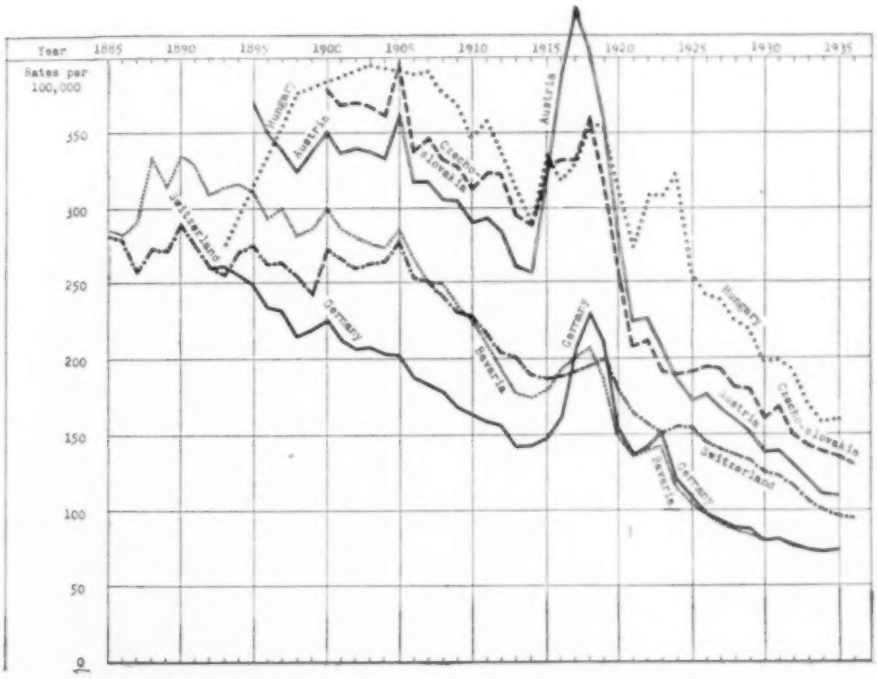


CHART 2—Tuberculosis Death Rates in Switzerland, Bavaria, Austria-Hungary, and Czechoslovakia during Fifty Year Period 1885–1935

Based on data exclusively from *Epidemiological Reports*, Health Section, League of Nations

TABLE 3

Tuberculosis Mortality in 24 Different Countries in Pre-war, Mid-war and Post-war Years: 1913, 1917, and 1920*

	Pre-war 1913		*Mid-war 1917*		*Post-war 1920*	
Country	*Deaths*	*Rate*	*Deaths*	*Rate*	*Deaths*	*Rate*
United States	142,838	148	150,194	147	121,459	114
Ireland	9,387	214	9,680	221	7,651	170
Scotland	8,073	169	7,680	159	6,038	124
England, Wales	49,476	135	55,934	162	42,545	113
Belgium	8,774	118	15,720	211	8,507	114
France‡	84,443	212	71,247	211	66,824	185
Italy‡	52,864	143	62,167	175	57,848	160
Spain	30,116	152	35,586	172	38,425	180
Bavaria	12,479	177	14,237	200	10,800	151
Germany	94,927	143	133,223	206	92,793	154
Austria‡	75,379	259	130,049	432	18,812	284
Hungary‡	69,883	328	71,012	383	28,028	348
Czecho-Slovakia	41,434	296	45,624	331	35,555	261
Finland†	8,316	261	8,570	261	7,360	219
Norway	5,457	221	5,452	212	5,033	190
Sweden	10,428	185	11,289	195	9,564	162
Denmark	3,618	126	4,839	158	3,636	113
Netherlands	8,890	142	12,128	182	10,240	147
Switzerland	7,788	202	8,047	207	6,984	180
Japan	110,753	208	124,787	223	125,165	224
Philippines	18,392	228	22,849	250	26,474	275
Australia	3,800	81	3,364	66	3,607	67
New Zealand	812	76	755	69	851	71
South Africa¶	676	51	711	50	688	46

* All forms of tuberculosis. † Pulmonary tuberculosis. ° Civilian population. ¶ White population. ‡ France, 77 non-invaded departments. Italy, 1917–1920, non-invaded communes. Austria, pre-war, 1913–1918; population, in 1911, 28,649,449; in 1920, 6,476,000. Hungary, pre-war, 1913–1918; population, in 1910, 20,792,709; in 1920, 8,054,000. Compiled from *Epidemiological Reports*, Health Section, League of Nations; Annuaire Statistique. France; Official Yearbooks of certain countries listed, etc.

war and the blockade had first made their influence felt in 1914 by arresting progress. In 1915 the rate rose 6 points higher; in 1916, there was an increase of 12,000 deaths over the pre-war annual figures. Steadily the specter of tuberculosis rose and an increasing number of victims were taken in 1917 and 1918. In the latter year, 54,817 more deaths from tuberculosis occurred than in 1914.

The number of deaths from all forms of tuberculosis during the year ending the war, 1918, totalled 147,733 as against 92,916 in 1914. The death rate of 1918 was 229 as compared with 142 in 1914, representing a 60 per cent rise over that of four years previous. The death rate of 1920 was still higher than that of 1914, 154 against 142.

During the seven years from 1914 to 1920 inclusive, tuberculosis alone killed 800,000 people in Germany.

The 50,000,000 people of pre-war Austria-Hungary paid an even higher toll from tuberculosis than did the German people during World War I. It should first be remarked, however, that in those central sections of Europe high tuberculosis death rates were then prevailing. In 1913, the rate was 259 per 100,000 in Austria and 328 in Hungary; in the latter country, it rose to 410 in 1918. In Austria, the tuberculosis death rate of 1917, namely 432, exceeded that of 1913 by 67 per cent. In that mid-year of the war, the tuberculosis deaths in Austria numbered 130,049 as compared with 75,379 in 1913.

Everyone recalls the terror tuberculosis inspired in Vienna during the war years, the death rate going up

TABLE 4

Tuberculosis Mortality in 34 Large Cities of the World in Pre-war, Mid-war and Post-war Years: 1913, 1917, and 1920*

	Pre-war 1913		*Mid-war 1917*		*Post-war 1920*	
City	*Deaths*	*Rate*	*Deaths*	*Rate*	*Deaths*	*Rate*
New York	10,031	199	10,142	188	7,135	126
Montreal	1,073	215	1,088	195	1,100	182
Rio-de-Janeiro	4,045	417	4,217	392	4,608	394
Sao Paulo	533	117	650	124	634	110
Sydney	784	82	526	55	787	71
Melbourne	898	110	825	101	800	98
Tokyo	8,697	427	8,959	381	8,365	352
Bombay	2,152	219	2,118	216	1,841	187
Belfast	1,188	300	1,201	305	1,008	243
Edinburgh	540	159	575	151	417	102
London	5,863	165	6,768	211	4,675	129
Lille	662	306	869	402	391	181
Paris	10,975	385	10,184	358	7,907	272
Madrid	2,262	301	2,930	390	2,945	392
Rome	1,549	224	1,943	281	1,645	238
Helsinski	623	315	485	245	404	204
Oslo	589	228	501	194	540	209
Stockholm	1,097	260	975	231	882	209
Copenhagen	796	142	1,105	197	661	118
Amsterdam	997	154	1,314	203	1,016	157
The Hague	519	147†	590	167	435	123
Rotterdam	750	147†	1,077	211	863	169
Brussels‡	1,552	198‡	1,853	252¶	...	...
Berlin	7,037	185	12,286	323	6,695	176
Vienna	6,376	323	9,084	479	7,457	405
Budapest	4,276	361	7,570	639	5,307	448
Prague	1,638	304	2,485	409	1,668	253
Leningrad+	6,122	286	7,203	331	9,891	504
Moscow	4,508	266	4,296	232	4,450	397
Kief	...	...	°1,332	364	2,445	688
Warsaw	3,315	306	9,070	974	3,138	337
Ldoz	...	...	5,097	1,164	2,704§	604§
Lwow	1,006	480	1,425	665	...	...
Cracow	778	487	1,548	908	...	...

* All forms of tuberculosis. † Average annual rate, four year period 1911–1914. ‡ Five year period 1911–1915; ¶ 1916–1920. + Pulmonary tuberculosis. ° Year 1918. § Year 1919. Compiled generally from *Epidemiological Reports*, Health Section, League of Nations, or from official reports of cities listed.

steadily from 315 in 1914 to 362 in 1915, 407 in 1916, 479 in 1917, 476 in 1918, reaching 527 in 1919 even after the war—and this mortality was only among civilians. In addition, there were almost a third as many other tuberculosis deaths in military hospitals of the city.

But how few of us are aware that conditions were even worse in Budapest. Official reports, which appeared subsequently, revealed tuberculosis death rates in Hungary's capital of 515 in 1916, of 639 in 1917, and of 642 in 1918.

A partial estimate of the additional deaths due to tuberculosis because of World War I conditions in Germany and Austria-Hungary alone—not to mention their allies at that time, Bulgaria and Turkey—can again be made by applying the 1914 rate to the 4 year period of 1915–1918. The expected number of deaths should have been 905,376; instead the actual number recorded was 1,228,437, an excess during four years alone of 323,061.

The magnitude of this excess mortality due to tuberculosis in Austria-Hungary can be better visualized when we recall that all the American soldiers killed or who died during World War I, namely 126,000, were less than half of the number just quoted.

RUSSIA, POLAND

Of other warring nations at that time, only the barest tuberculosis records are at hand for so large and important a country as Russia. There, war was followed by defeat at the hands of Germany, a second war with Poland, finally by revolution and famine. Conditions in Russia in 1920 were even worse than in 1917 or 1918.

Personal communications and figures which I received subsequently from Wedenskaya,[6] of the State Tuberculosis Institute, stated that in Moscow the death rate, which was 202 in 1918, rose only two years later, namely in 1920, to 397 or by nearly 100 per cent. In Leningrad, each year of the war and for a time thereafter, an increase in tuberculosis mortality was registered. Starting in 1914 at 299, the death rate was 306 in 1915, 319 in 1916, 331 in 1917, 355 in 1918, 438 in 1919 and 504 in 1920. At Kief, in the Ukraine, according to the Health Section of the League of Nations, an even more frightful death rate prevailed in 1920, 688 per 100,000 population.

The Polish people, caught in the whirlpools of war between, and with, both Germany and Russia, suffered most from tuberculosis; partial records are available for only a few centers of population. In Warsaw, the death rate in 1917 was treble that of 1913—974 compared with 306. In Lwow, the death rate reached 741 as early as 1915. In Cracow, the tuberculosis death rate in 1917 was 908, or nearly twice that of 1913. And, in Ldoz, the incredible rate of 1,164 was attained in the mid-war year of 1917. Eleven persons out of every 1,000 living there died from tuberculosis in a single year.

NEUTRAL COUNTRIES

Neutral countries, especially those neighboring on the war zones, felt and also registered a higher tuberculosis mortality from the effects of the blockade and interference with the flow of commodities, especially food.

In Spain, the tuberculosis death rate rose steadily until 1918 and kept higher both in 1919 and 1920 than in the pre-war year of 1913. From 152 at first it went up to 172 in 1917 and to 180 in 1920. In Madrid, as against a rate of 301 in 1913, we find one of 392 in 1920.

In the Scandinavian group of Finland, Norway, and Sweden, at some time or other, each experienced during the war years high tuberculosis death rates or some increase.

Denmark and the Netherlands also paid a toll of lives to the Moloch of tuberculosis. In 1917, the tuberculosis death rate of the Danes, 158 per 100,000 population, was 25 per cent higher than in 1913.

In Holland, at the same time, the death rate rose from 142 to 182, or by 28 per cent. In Amsterdam, Rotterdam, and The Hague, the death rates were higher than usual throughout the war. According to Prinzing,[7] during the six years of 1915 to 1920 inclusive there were 67,639 deaths from tuberculosis in Holland among the 6,800,000 people then living in that country. In 1918, the death rate among men was 40 per cent higher than in 1914 and that of women had increased by 50 per cent.

A significant remark at that time might be quoted here: "During wartime, governments were generally careful at least to assure sufficient food for the soldiers at the front, whereas for the civilian population and the women it was limited and rationed."

Even in far-off Japan the decline of tuberculosis was delayed by World War I. Higher rates than in 1913 prevailed throughout the war years. That nation paid a high price for the hard conditions under which its people labor. In 1918, the death rate in Tokyo was 430; women suffered even

more than the men. More than half of the deaths in females occurred among girls and young women between the ages of 10 and 30.

* * *

We are told that among the armed forces of the entire British Empire in World War I, which lasted more than four years, 908,371 soldiers were killed or died. In the twenty-four countries to which we have been referring and which do not include Russia, during the single year of 1917—not the worst year which was 1918 but which I am not stressing because of the influenza pandemic—there were recorded in just twelve months 1,005,144 deaths from tuberculosis alone.

REFERENCES

1. Drolet, Godias J. Present Trends of Case Fatality Rates in Tuberculosis. *Am. Rev. Tuberc.*, 37, 2:125–151 (Feb.), 1938.
2. Wolford, Roy A., Col. M.C., A.U.S. *Proceedings, Fortieth Annual Meeting*, National Tuberculosis Association, Chicago, May, 1944.
3. Spillman, Ramsay. The Value of Radiography in Detecting Tuberculosis in Recruits. *J.A.M.A.*, 115:1371–1738 (Oct.), 1940.
4. Smiley, Dean F., and Raskin, Herbert A. Tuberculosis as a Naval Problem—An address before the Southern Chapter. Am. College Chest Physicians, Cincinnati, O., Nov. 17, 1943.
5. Miller, A. F. The New Knowledge of Tuberculosis. *Canad. M. A. J.*, 50:243 (Mar.), 1944.
6. Wedenskaya, Natalie. Personal communication, June 26, 1926.
7. Prinzing. *Beitr. z. Klin. d. Tuberk.*, 50:505 1922.

Appreciative acknowledgment is made of the assistance given by Mrs. R. D. Hart in the compilation of the widely scattered records required for this review.

Medical Care Versus the Draft

Testimony on June 13 before the House Committee on Postwar Military Policy in Washington related to the enactment of legislation requiring peacetime training.

According to the *New York Times*, Lewis G. Hines, speaking for the American Federation of Labor, told the committee that if health and discipline were the objectives of the proposal, then the government should provide a health program that would benefit citizens before they reach military age, and that the nation should look to the family, the schools, the church and community institutions for discipline.

"We believe," he said, "that it is very important to the national welfare, especially from a military standpoint, that more adequate medical care be given to the children of the nation, in order that they may be fit to serve their nation's need upon reaching the age of maturity."

Problems of Morbidity Reporting from the Standpoint of National Public Health Activities*

G. ST. J. PERROTT, F.A.P.H.A.

Division of Public Health Methods, U. S. Public Health Service, Washington, D. C.

ALL here will agree that adequate knowledge of the amount and kinds of illnesses which currently affect the population is a prerequisite of any rational public health program. Furthermore, it is generally recognized that the two main sources of data which we possess on the subject: official mortality and morbidity statistics, fail to give us sufficient knowledge.

The essential limitations of mortality statistics are in the nature of the data and cannot be corrected by those who collect them. No matter how accurate and complete mortality statistics are, they can furnish direct knowledge of only a few of the health problems of a population, and, at best, inferential information about some others. Mortality statistics can tell us how many persons die from a specified disease in a given period but cannot tell us exactly how prevalent the disease is during that period. The limitations of mortality statistics as a measure of prevalence become more apparent as therapeutic medicine progresses. When by the introduction of new drugs—for example, the sulfa drugs in relation to meningitis—the fatality rate of a disease diminishes considerably, data on deaths from the disease will reveal even less the extent of the problem of its prevention and control.

On the other hand, there does not appear to be any theoretical reason why official morbidity statistics should not furnish us with comprehensive information on the state of health of the population. Yet we are all aware that morbidity reporting as it is now being carried out has many defects and fails to achieve this objective.

In the first place, morbidity reporting has been and still is mainly concerned with infectious diseases. Second, statutes relative to the kind of diseases to be reported vary from state to state. In the third place, the completeness of reporting varies in relation to disease, and from state to state. Thus we find that when the reports made to the U. S. Public Health Service are compared with results of surveys, the case rates show a deficiency of 70 per cent for scarlet fever, and 80 to 90 per cent for measles and whooping cough. All of these defects limit considerably the value of the reports. As a consequence, when information is really desired about disease prevalence or incidence, costly studies have to be undertaken to furnish the data which should have been available from the reports already collected.

To correct the defects of morbidity reporting will undoubtedly be a difficult undertaking. It will require the

* Presented before the Vital Statistics Section of the American Public Health Association at the Seventy-third Annual Meeting in New York, N. Y., October 4, 1944.

solution of many kinds of problems in all fields of public health activities from diagnostic techniques to administration and law.

Among these problems the more important are those concerning:

1. *Completeness of reporting*—Two main problems must be considered. The first arises from the fact that a certain proportion of sick persons never call a physician or nurse, or visit a clinic or hospital. This proportion will vary according to the socio-economic status of the population, the medical facilities available, and the nature of the diseases themselves. The minor respiratory diseases are in general seen relatively infrequently; accidental traumas are attended in almost all cases.

The problem here is how to measure the proportion of unattended cases of a specified disease in a population. It is clear that controls of some kind must be set up for the purpose. This means utilizing other and independent sources of information on sickness, such as school and industrial sickness records. The feasibility of using these sources for control deserves investigation, as does the practicability of periodic spot surveys on a sample population.

Another problem results from the variation in reporting on the part of the physicians. There are penalties of various degrees for omission in reporting, but these penalties are for the most part a dead letter. In view of this, the question arises: "Why fill statute books with such law?" It would seem wiser to investigate why some physicians do not comply, and to work out arrangements that will assure their coöperation. It is doubtful that omission on the part of physicians is often a deliberate attempt to flout the law. Probably it is lack of appreciation of the value of such reports, or it may be due to the additional clerical work involved. If either or both of these explanations be correct the situation could be remedied in various ways. Among others, it might be well to experiment further with granting nominal compensation for the reports. In addition, and more important, the reasons for lack of interest on the part of physicians should be carefully examined and, when necessary, procedures should be initiated to stimulate their interest and coöperation. In any event, the need for some measure of reporting completeness on the part of physicians and institutions is just as important as for the cases not seen by physicians. The feasibility of the controls mentioned above should be investigated for both aspects of incompleteness of reporting.

2. *Characteristics of the diseases reported*—Another series of important problems arises in relation to the kinds of diseases to be included in morbidity reporting. Recently there has been a tendency in many states toward reporting non-infectious diseases. Thus certain occupational diseases are reportable in some states, and cancer in a few.

From the standpoint of obtaining statistics for the state of health of the country as a whole it would be desirable to have all states report certain important diseases. This requires definition of what constitutes an important disease in relation to public health work. Some agreement will have to be reached on the matter, taking into account the frequency of the diseases, the fatality and disability connected with them, and their preventability. Foremost in mind should always be that any list is not final, but should be altered as conditions demand it. In particular, it is well not to increase indefinitely the list of reportable diseases. Instead, thought should be given as to whether there are diseases which could or should be dropped because of the difficulty in obtaining accurate and complete data or because of their lack of significance relative to public health work.

Another important problem in this

series concerns the accuracy of the diagnosis of the disease reported. It is obvious that, for the study of trends or for comparisons between communities or states, it is necessary to know whether we are dealing with data confirmed by laboratory and other tests or not. It is particularly true in the case of epidemic or endemic diseases, the reporting of which is often influenced by local conditions. During influenza epidemics any upper respiratory infection is apt to be diagnosed as influenza, and in areas of malaria prevalence all aches and pains are malaria. It would seem logical that reports should indicate whether the diagnosis has been confirmed by some standard means.

Another and equally important problem is that of including in the morbidity reporting certain chronic diseases of public health significance. In this connection we have also the question of defining what should be reported: new cases only, cases in the early stages, recurrent manifestations, or those in late stages. At present we do not have the faintest notion whether for such diseases as malaria or syphilis we are dealing with prevalence or incidence. To give real meaning to the data this information should be indicated in some manner.

3. *Characteristics of the individual*—The age, sex, race, occupation, are all elements of importance for an accurate picture of the morbidity in an area and for comparison among states or local areas.

To record and report such information as well as more accurate data on the characteristics of the disease would require revision of reporting forms and of filing systems in many county and local health units and even in some state health departments.

I have outlined some of the major problems concerned with morbidity reporting. These problems are rather obvious to anyone who has given thought to the possibility of improving morbidity reporting. In summary, these problems concern:

1. Measurement of the level of underreporting
2. New methods for getting better coöperation from physicians and institutions which furnish data
3. Selection of diseases to be reported from all states
4. Reporting and recording certain characteristics about the diseases and individuals in order that the data will have greater value as a measure of the state of health of the nation

Notwithstanding their complexity, there is no doubt that we have at hand the means to solve these problems, but it will require the coöperative efforts of all concerned with public health: the U. S. Public Health Service, the state and local health departments, and the physicians and hospitals. Therefore, in addition to considering the specific problems mentioned we should also consider how best the needed coöperation can be achieved.

Applications of the Complement-Fixation Test in the Study of Rickettsial Diseases*

IDA A. BENGTSON, PH.D.

Senior Bacteriologist, National Institute of Health, Bethesda, Md.

TESTS employed for the identification and differentiation of rickettsial diseases include immunity tests in animals. the Weil-Felix test and the complement-fixation test.

Immunity tests in guinea pigs were performed by Anderson and Goldberger in 1912 [1] in studies on European typhus and in experiments to determine the relationship between Brill's disease and Mexican typhus. Since that time immunity and cross-immunity tests in guinea pigs have been employed extensively in the study of rickettsial diseases and much valuable information has been gained. However, from the standpoint of the diagnosis of a case of suspected rickettsial disease, these tests require an extended period of time and often fail to yield conclusive results. In the first place, it may not be possible to establish infection in the guinea pig because the blood from the patient may not have been obtained at a favorable time and the amount of the virus in the blood may not be sufficiently concentrated. If the guinea pig becomes infected, sufficient time must then elapse for recovery from the infection (2–3 weeks) before the challenge dose of known virus is administered. Another period of 1 to 2 weeks is required before it can be determined whether the guinea pig has developed a second infection or is immune.

The Weil-Felix test discovered in 1916 [2] has been exceedingly valuable as a rapid diagnostic test both because of its simplicity and because of the remarkable accuracy with which it detects rickettsial infection. However, after long continued use it has been shown to have certain limitations and shortcomings. There has always been a question as to the significant titer. Weil and Felix regarded a titer of 1/25 as early presumptive evidence of typhus and 1/50 as definite evidence of infection. Now the tendency is to consider only a titer of above 1/80 as significant. The test was regarded for a number of years as highly specific for typhus, but Kerlee and Spencer (1928),[3] and Spencer and Maxcy (1930)[4] found it was positive also in a large proportion of cases of Rocky Mountain spotted fever. Since then it has been generally accepted that the Weil-Felix test does not differentiate between the two diseases.

The complement-fixation test for the diagnosis of rickettsial disease has the advantage of the rapidity of the Weil-Felix test, it is comparatively simple, and is more specific. This test could only be employed extensively after it was possible to obtain large amounts of

* Presented before the Epidemiology Section of the American Public Health Association at the Seventy-third Annual Meeting in New York, N. Y., October 3, 1944.

rickettsiae for use in the preparation of antigens. The yolk sac method of Cox[5] for the cultivation of rickettsiae was the answer to this problem.

Since 1941 there has been opportunity to make use of the complement-fixation test on a rather large scale at the National Institute of Health. Over 10,000 tests have been made on sera from various sources, and numerous tests have been made with experimental antigens against known sera. Many of the sera were received from state laboratories, from hospitals, and from physicians in private practice.

This report will present an analysis of some of the results obtained during the past three years, considering in particular tests for the diagnosis of rickettsial disease occurring in this country, and including also tests on wild rat sera from endemic typhus areas to obtain evidence of typhus infection in these rodents.

The test is performed as has been previously described.[6] Twofold dilutions of inactivated serum in 0.2 ml. amounts are employed in the test. Two-tenths ml. amounts of the antigen suitably diluted and 2 full units of complement contained in 0.2 ml. are added. After a period of 1 hour fixation in the 37° C. water bath, 0.4 ml. of 2 per cent sheep red cells sensitized with 2 units of hemolysin are added and incubation continued for another hour at 37° C., after which the test is stored at refrigerator temperature over-

TABLE 1

Human Sera Positive for Rickettsial Diseases by Complement-Fixation

	Serum Titers												
	1/4	*1/8*	*1/16*	*1/32*	*1/64*	*1/128*	*1/256*	*1/512*	*1/1,024*	*1/2,048*	*1/4,096*	*1/8,192*	*Total*
	Positive Rocky Mountain Spotted Fever Sera												
No cross-fixation	7	13	22	16	18	20	18	42	10	18	4	11	199 (92.1%)
Slight cross-fixation (1/4–1/8) with endemic typhus antigen				1 (1/8)		2 (1/4, 1/4)	2 (1/4, 1/4)	2 (1/8, 1/8)			1 (1/4)		8 (3.7%)
Cross-fixation with endemic typhus antigen above 1/8 but difference of 2 to 5 twofold dilutions in result							1 (1/32)	2 (1/64, 1/128)		4 (1/64, 1/64, 1/64, 1/128)	1 (1/256)	1 (1/128)	9 (4.1%)
												Total	216
	Positive Endemic Typhus Sera												
No cross-fixation	1	1	5	9	8	7	10	26	8	9	3	5	92 (80.%)
Slight cross-fixation (1/4–1/8)				1 (1/8)			2 (1/4, 1/4)	3 (1/4, 1/4, 1/8)		3 (1/4, 1/8, 1/8)	1 (1/8)	1 (1/4)	11 (9.6%)
Cross-fixation					1 (1/16)			4 (1/16, 1/16, 1/16, 1/64)		4 (1/32, 1/32, 1/128, 1/512)		3 (1/64, 1/64, 1/1,024)	11 (9.6%)
												Total	114

night and the results are read the following morning.

Results of the complement-fixation test in 330 positive human sera—Among approximately 1,000 sera tested for both Rocky Mountain spotted fever and endemic typhus, 330 were positive by the complement-fixation test for one or the other of these diseases. The titers of these sera ranged from 1/4 to 1/8,192 (Table 1). In the great majority of the tests there was complete specificity with no cross-fixation whatever. Among 216 sera positive for Rocky Mountain spotted fever, 92.1 per cent showed no cross-fixation, 3.7 per cent slight cross-fixation (in dilutions 1/4 to 1/8), while 4.1 per cent showed cross-fixation in dilutions higher than 1/8 but with differences of 2 to 5 twofold dilutions in the results with the two antigens. Among 114 sera positive for endemic typhus there was no cross-fixation in 80.7 per cent. There was slight cross-fixation in 9.6 per cent (in dilutions 1/4 to 1/8) and cross-fixation in dilutions higher than 1/8 in 9.6 per cent, but with differences of 2 to 8 twofold dilutions in the results with the two antigens.

Even though a comparatively small number of tests have been made, the results shown indicate that the test as performed is somewhat more specific for Rocky Mountain spotted fever than for endemic typhus. Further consideration is being given the matter of the cross-fixation reactions referred to. The possibility of previous apparent or inapparent infection on those cases in which it occurs is being investigated. In some cases a previous vaccination history, as in soldiers or laboratory workers, should be considered. If there is a true antigenic relationship between the two diseases, elimination of the common antigenic factor by special means, as by the use of absorption tests or by the use of purified antigens, will probably yield results which are more specific.

TABLE 2

77 Early Cases among 322 showing a Positive Complement-fixation Reaction and a Negative Weil-Felix Reaction

	No. of Sera Positive	
Complement-fixation Titers	*Rocky Mountain Spotted Fever*	*Endemic Typhus*
1/4	1	0
1/8	5	1
1/16	5	2
1/32	5	2
1/64	6	7
1/128	2	6
1/256	6	5
1/512	8	3
1/1,024	2	0
1/2,048	5	0
1/4,096	1	0
1/8,192	3	2
Total	49	28

Comparative data on the Weil-Felix and the complement-fixation tests—Although a positive Weil-Felix test may often be in evidence earlier in cases of rickettsial disease than a positive complement-fixation reaction, still a certain number of cases develop a positive complement-fixation reaction first. Among 322 sera tested diagnostically by both reactions 77, or 23.9 per cent, were positive by the complement-fixation test and negative by the Weil-Felix test. The complement-fixation titers of these sera varied from 1/4 to 1/8,192 (Table 2).

In contrast to those cases which have a positive complement-fixation reaction and which are negative by the Weil-Felix, certain cases which are clinically rickettsial infections may give a high Weil-Felix reaction and a low or atypical complement-fixation reaction. Usually second or third specimens taken after a longer period will yield more definite results. A type of reaction which occurs occasionally is one in which there is partial fixation to fairly high dilutions but no complete fixation in any. One particular case with a known laboratory infection with epidemic typhus persistently showed re-

TABLE 3

Atypical Complement-fixation Reactions

Number	Serum Dilutions 1/4	1/8	1/16	1/32	1/64	1/128	1/256	1/512	Weil-Felix Titer
				Antigen Diluted as Usual					
10,176	1	1	2	1	1	1	1	1	1/5,120
10,178	1	1	tr	tr	tr	tr	tr	tr	1/2,560
				Antigen Four Times as Concentrated					
10,176	4	4	4	3	3	2	1	1	
10,178	4	4	4	3	3	2	1	tr	

sults in which fixation was not entirely complete in any dilution. Successive specimens from several other cases have shown a similar tendency.

There are several methods of approach to the solution of the problem of the atypical reactions referred to. By increasing the concentration of the antigen over that usually employed, a more typical reaction may sometimes be obtained (Table 3).

The test may also be rendered more sensitive by reducing the amount of complement and by icebox fixation.

On the basis of the above considerations it therefore appears that the two tests supplement each other. In the great majority of cases good agreement is obtained with both tests when they are used for purposes of diagnosis. This does not mean that comparable titers are obtained, but that significant titers are. On the other hand, if a high Weil-Felix titer is obtained with a low complement-fixation titer, this immediately suggests the testing of a later specimen or retesting the same specimen in such a way as to render the test more sensitive. Proteus infection should also be considered. A high complement-fixation titer with a low Weil-Felix titer may be considered as evidence of rickettsial infection without further testing.

Epidemiological value of the complement-fixation test—From the epidemiological standpoint a test which indicates past infection is of value. The persistence of the complement-fixation reaction in the serum of patients, long after recovery, has been given some consideration in previous reports, but a further presentation of results obtained in some of these tests may be of interest (Table 4).

The Weil-Felix test in all instances

TABLE 4

Old Cases of Rickettsial Disease with a Positive Complement-fixation Reaction but Without a Significant Weil-Felix Reaction

No.	Date Tested	Years After Onset	Nature of Illness and Date of Onset	Complement fixation: Endemic Typhus	Rocky Mt. Spotted Fever	Epidemic Typhus	Weil Felix OX-19
371	August, 1942	1	Suspected R.M.S.F., 1941		1/64		1/20
1,111	September, 1942	3	R.M.S.F., 1939		1/16		0
1,297	October, 1942	6	Typhus-like infection, 1936	1/32			1/80
1,967	December, 1942	1	Endemic typhus, October, 1940	1/64			1/40
3,267	March, 1943	25	Epidemic typhus, 1918			1/16	1/10
4,297	June, 1943	7	R.M.S.F., 1937		1/16		1/10
4,298	June, 1943	5	R.M.S.F., 1939		1/128		1/10
9,547	July, 1944	3	R.M.S.F., June, 1941		1/16		0
9,548	July, 1944	1	R.M.S.F., July, 1943		1/128		1/20
9,626	July, 1944	4	R.M.S.F., May, 1940		1/16		0
9,627	July, 1944	3	R.M.S.F., August, 1941		1/8		1/20

was too low to be of significance but the complement-fixation reaction showed a significant titer. While a positive titer is not obtained in all cases of past human rickettsial infection, data collected thus far indicate that a positive result by complement-fixation may be expected in a large percentage of cases, while negative results or low titers which are not significant are often obtained with the Weil-Felix test after a period of 6 to 12 months.

The complement-fixation test for determining evidence of typhus infection in wild rats—A report has recently been completed by Dr. Brigham and the writer [7] on the complement-fixation and Weil-Felix tests in wild rats as related to the isolation of the virus of endemic typhus fever from these rodents. As is the case in humans, the complement-fixation reaction persists for a longer time in typhus infected rats than does the Weil-Felix reaction. It was shown by Dr. Brigham that following the inoculation of white rats with a known strain of typhus, the Weil-Felix reaction appeared about the 6th day and persisted for about 15 days, after which time it was completely negative. The complement-fixation tests on the same sera were positive until up to 10 months when the experiment was terminated. Isolation of the virus from the brains of guinea pigs inoculated with blood from the infected rats was successful up to 6 months, and correlated perfectly with the results of the complement-fixation test.

The serological data obtained as the result of the tests on wild rat sera showed that the Weil-Felix reaction was positive in 64 (1.9 per cent) of 3,430 rat sera tested, while of 1,392 sera subjected to both the Weil-Felix and the complement-fixation test 651 (46.7 per cent) were positive by the complement-fixation test and 51 (3.6 per cent) were positive by the Weil-Felix test. Isolations of virus were also attempted from the wild rats. The brains of 1,958 rats were inoculated, by pools, into guinea pigs, the results indicating at least 0.87 per cent active infection. Among 350 brains inoculated singly there were 30, or 8.5 per cent, which gave positive isolations. A positive complement-fixation reaction was obtained in 25 of 26 of the corresponding rat sera.

Since the completion of the study described, approximately 1,000 rat sera from other typhus areas have been received for testing at the National Institute of Health. The percentage of those positive by the complement-fixation test is comparable with those obtained in the investigation just discussed while the number showing a positive Weil-Felix reaction has been practically negligible.

It is therefore apparent that the Weil-Felix test is of little value as an indicator of infection in wild rats in this country. The reaction is probably evanescent in the wild rat as it has been shown to be in white rats experimentally infected. Possibly it is the young rats which usually acquire the infection and these are probably not used as often for purposes of collecting blood specimens as the older and larger rats.

The high percentage of positive results by complement-fixation in rats from endemic typhus areas suggests the use of this test for obtaining presumptive evidence to determine which form of the disease may be present in areas where it is a question whether the disease is epidemic or endemic typhus. Positive complement-fixation results in the sera of wild rats would point to endemic typhus. Negative results would indicate the absence of endemic typhus with the possibility that the disease might be epidemic typhus, since this wild rat is not known to be the reservoir of this disease. The results would thus suggest control measures

to prevent the spread of the particular form of typhus occurring in the locality in question. It might be necessary to examine a considerable number of rats, but if these are trapped in locations where cases of typhus have occurred it should not be difficult to obtain the desired information.

The complement-fixation test as a routine diagnostic test—The question has been raised whether it would be feasible for a diagnostic laboratory to adopt the complement-fixation test as a routine measure for testing sera from cases of suspected rickettsial disease and also from rats in typhus areas. The principal obstacle standing in the way of attaining this objective has been the lack of sufficient antigenic material, particularly the antigen for testing for Rocky Mountain spotted fever. The problem of sufficient antigen for testing for endemic typhus is less difficult as very satisfactory tests have been obtained by the use of epidemic typhus vaccines as antigens. The considerable amount of cross-fixation occurring between epidemic and endemic typhus with antigens prepared much as epidemic typhus vaccines are prepared, though a disadvantage in so far as differentiation between these two diseases is concerned, is an advantage in testing sera for endemic typhus, if other endemic typhus antigens are not available. On the other hand, it is quite probable that specific antigens will be available in the near future.

As to the techniques of the test, laboratories which are equipped to do Wassermann tests should have no difficulty in performing this test. It is not advocated that complement-fixation testing for rickettsial disease should replace the Weil-Felix test, but the additional information gained with the complement-fixation test should justify its use. The test is more specific and titers even as low as 1/4 may be considered significant. In this connection it may be stated that numerous control tests have been made at the National Institute of Health which support this view. For a period covering approximately a year all sera received at the National Institute of Health with requests for agglutination tests were also tested for complement-fixation against endemic typhus antigen. Of 292 sera including 27 positive for tularemia, 6 positive for undulant fever, 7 positive for typhoid and paratyphoid fevers, and 252 negative by all tests, none showed a positive complement-fixation test against endemic typhus antigen. Also approximately 150 sera from patients with atypical pneumonia yielded negative results when tested against an endemic typhus antigen. Also negative results have been obtained in several hundred known normal sera tested against endemic and epidemic typhus antigens.

SUMMARY

An analysis of the results obtained in the testing of 330 human sera which were positive by the complement-fixation test for either endemic typhus or Rocky Mountain spotted fever is presented. In 92.1 per cent of the 216 spotted fever sera tested there was no cross-fixation with endemic typhus antigen although titers as high as 1/8,192 were obtained in some of the tests. There was slight cross-fixation (1/4–1/8 dilutions) in 3.7 per cent and higher cross-fixation in 4.1 per cent, though this as a rule was in higher titered sera. Among the 114 endemic typhus fever sera there was no cross-fixation whatever with Rocky Mountain spotted fever antigens in 80.7 per cent, slight cross-fixation (1/4–1/8 dilutions) in 9.6 per cent, and cross-fixation above 1/8 in 9.6 per cent.

In tests on sera from wild rats trapped in endemic typhus areas, positive complement-fixation reactions for endemic typhus showed evidence of in-

fection in a high percentage of the rats (up to 46.7 per cent in one group) while the Weil-Felix test was positive in low percentages (3.6 per cent in one group and in an almost negligible percentage in another).

The complement-fixation test was found to furnish evidence of rickettsial infection earlier than the Weil-Felix test in 23.9 per cent of the human sera tested. From an epidemiological standpoint the complement-fixation test is superior to the Weil-Felix test because a positive complement-reaction persists longer both in humans and in wild rats than does a positive Weil-Felix reaction.

Low titers are significant in the complement-fixation test as indicated by negative results on a number of non-rickettsial and normal sera.

It may be considered feasible for diagnostic laboratories to employ the complement-fixation test as a routine procedure in the diagnosis of rickettsial disease, when antigens are more readily available.

REFERENCES

1. Anderson, John F., and Goldberger, Joseph. Studies on Immunity and Means of Transmission of Typhus. *Hyg. Lab. Bull.* No. 86, 81 (Oct.), 1912.

2. Weil, E., and Felix, A. Das serologischen Diagnose des Fleckfiebers. *Wien Klin. Wchnschr.*, 29, 2:33 (Jan. 13), 1916.

3. Kerlee, A. L., and Spencer, R. R. Rocky Mountain Spotted Fever. A Preliminary Report on the Weil-Felix Reaction. *Pub. Health Rep.*, 44, 4:179 (Jan. 25), 1929.

4. Spencer, R. R., and Maxcy, K. F. The Weil-Felix Reaction in Endemic Typhus Fever and in Rocky Mountain Spotted Fever. *Pub. Health Rep.*, 45, 9:440 (Feb. 28), 1930.

5. Cox, H. R. Use of Yolk Sac of Developing Chick Embryo as Medium for Growing Rickettsiae of Rocky Mountain Spotted Fever and Typhus Groups. *Pub. Health Rep.*, 53, 51:2241 (Dec. 23, 1938), 1939.

6. Bengtson, Ida A. Complement-fixation in the Rickettsial Diseases—Technique of the Test. *Pub. Health Rep.*, 59, 12:402 (Mar. 24), 1944.

7. Brigham, George D., and Bengtson, Ida A. A Study of the Complement-fixation and Weil-Felix Reactions in Wild Rats as Related to the Isolation of the Virus of Endemic Typhus. *Pub. Health Rep.*, 60, 2:29 (Jan. 12), 1945.

Tuberculosis Trends

Concern about the trend of the nation's death rate from tuberculosis, which shows increases concentrated in the industrial states of the northeast and north central sections of the country, and declines in the South and West, is being expressed by medical authorities and by the public.

It is possible that the population upheaval due to war work, which has no parallel in American history, will affect the trend of tuberculosis mortality for years to come. Only a new population census can provide the answer, but no census will be worth while until the people have had a few years to settle down after the war. These are the highlights of a survey made by Mary Dempsey, Statistician of the National Tuberculosis Association, New York, just released by the New York Tuberculosis and Health Association.

G. J. Drolet, Statistician of the local Association, stated that according to complete reports gathered by the Bureau of Records, Department of Health, New York City, which include death of New Yorkers both in town and out of town, there has been an increase of 8 per cent in the tuberculosis mortality during the past three years. Deaths from tuberculosis of New York City residents, anywhere, in 1942 were 3,946; 1943, 4,183, and 1944, 4,267.

Mental Hygiene in a Public Health Program — Its Implications*

C. F. McCLINTIC, M.D.

State Commissioner of Health, Williamsburg, W. Va.

MORE than fifty years ago an English neurologist published a paper in the neurological magazine, *Brain,* dealing with "Cerebral Manifestations in Visceral Disease." Included in the discussion were cardiac and gastrointestinal conditions. Recently an article appeared in the *Journal of the American Medical Association* describing a psychotic syndrome as a prodromal manifestation of malignant growths in the chest. Nolan D. C. Lewis has stated: "Those who neglect to take into account the psychological factors in disease should be reminded that psychological energy works through physical structures and produces physical effects . . ." In view of these statements one need not hesitate to include mental illness among those with which public health workers should concern themselves.

It is not the purpose of this paper to discuss mental hygiene in its application to institutional cases but only as it relates to the emotional and social adjustments of people who are found in our ambulatory population in everyday life. The main objective of mental hygiene in a public health program is the prevention of social maladjustments which eventually become social and economic handicaps to the individual and which may result in the individual becoming a ward of the state or a burden to near relatives. We might add that even this is the negative side of the objective because it has been demonstrated that mental hygiene programs have not only prevented individuals becoming dependent but they enable them to make their emotional and social adjustments so that they become a social and economic asset to society instead of a liability. The results are neither negative nor neutral, but positive.

With few exceptions, the awareness of the value of mental hygiene has been lacking among the greater part of our people and even among social minded individuals. One of the positive benefits of the present world catastrophe is that it has brought to our attention the magnitude of the problem of mental ill-health. As a result of the cases discovered through selective service we are forced to the conclusion that "institutionalized insanity," which costs us perhaps $770,000,000 annually, is only a small part of the mental illness problem, and probably the least expensive.

It is estimated that approximately 25,000,000 of our young men have been called by the draft boards. Of these about 10,000,000 have been rejected as physically unfit for combat duty, and of this number, 3,000,000 were rejected because they were not mentally fit. Contrast this number with the less

* Presidential Address delivered before the Twelfth Annual Meeting of the Southern Branch American Public Health Association in St. Louis, Mo., November 13, 1944.

than 1,000,000 in our welfare institutions and you can gain some idea of the size of the problem. Remember too, that these young men constitute only one segment of our population of 130,000,000. When we apply the above ratio to those who are older and younger in both sexes, it staggers the imagination.

Our job is to reduce the amount of mental illness by a program of prevention. This program should be so planned that it will begin with the unborn child. Do not take this statement to mean that your speaker is one of that group who believes that if a pregnant mother concentrates on playing the piano during gestation that she will give birth to a musical genius or if she mourns over the death of a pet rabbit that her new-born will arrive with a harelip. But every child is entitled to be born into an environment which is congenial to its mental, moral, and social development. This means, therefore, that a program of mental hygiene in its application should begin with the parents and continue with the child through adolescence and until he has made his permanent social adjustments. This does not mean that the program should be limited to the period just mentioned, but you will doubtless agree that more can be accomplished in the way of prevention within these age limits than at any other period in the life of the individual because of the potent influence of the parents and early environment on mental development.

From these general observations let us consider the implementation of a mental hygiene program. The implemented program is a triad. First, prevention; second, clinical services—including (a) child guidance, (b) dealing with pre-psychotic adults, (c) consultative service; and, three, education and community organization.

This outline does not necessarily mean that the program should be instituted chronologically in this order. Education and community organization may be the first in order in the establishment of the program. The first obstacle to be overcome is "sales resistance." The public mind must first be disabused of the stigma of mental illness in order to induce people to advocate and take advantage of the services. Mysticism must be dissipated. No other ailment is so shrouded in mysticism and superstition. They are as deeply ingrained as are the superstitions of ghosts, witches, black cats, banshees, walking under a ladder, and other superstitious ideas in our folklore.

Fortunately in every community we find those well established public and private social agencies through which an approach can be made. In some instances we can enlist the aid of the local medical society. The local agencies which are most helpful are those which can make use of the clinical services in solving some of their perplexing problems. Among these are: (a) child welfare, (b) probation department, (c) juvenile courts, (d) public assistance, (e) the schools, and (f) the medical profession.

That these agencies are interested and use the facilities of the clinic is well illustrated by the preliminary report of George M. Lott on the work of the Suffolk clinic on Long Island, N. Y. In his report on the first two hundred cases to which services were rendered for the local agencies, the distribution was: 25 per cent were examined for the juvenile court and probation department; another 25 per cent for the county's social agencies; 50 per cent were studied for the schools and family physicians; 66⅔ per cent of the total were school children; 11 per cent were educational or learning disabilities; only 14½ per cent were found to be mentally deficient; 4½ per cent were cases of psychosis; 6 per cent neurotic; 5 per cent had physical defects; 33 per

cent were behavior and social problems.

This analysis plainly indicates why these agencies are interested, and points to the need and emphasizes the value of mental hygiene when properly utilized by these agencies. In other words, these are the implications of a mental hygiene program in a public health service.

JUVENILE DELINQUENCY

Looking further into these implications it is to be observed that for years juvenile delinquency has been one of our most serious social problems, and it is said to have increased 42 per cent since 1940. Last year it increased 30 per cent. Yet, a Detroit juvenile judge with an experience in this field extending over a third of a century emphasizes the fact that "every problem child has a problem parent." To discuss parental influence and home environment in relation to juvenile delinquency would exceed the limits permitted in this discussion. But let me impress upon you that 95 per cent of the men and boys in prison in the United States have been guilty of juvenile delinquency before they reached 15 years of age and that 85 per cent of the men and boys and 90 per cent of the women and girls in our prisons have come from broken homes.

The subtle influence of home environment plays an immense part in contributing to child delinquency. Let me cite briefly the case of a boy before a juvenile judge as an illustration. Due to a difficult labor when born and the lack of trained obstetrical care, the child lost one eye, with consequent disfigurement of the orbit. As a result, the thoughtless parents very innocently, along with the children of the family who were physically normal, nicknamed this child "Blinkey." When he entered school, his schoolmates took up the name and applied it in a disparaging manner. When he reached adolescence he developed a defense reaction against his handicap and became a nuisance in the community as a petty thief. He finally landed in juvenile court. There, after a careful case study by the staff which included social workers, psychologists, and psychiatrists, the judge arrived at the conclusion that his crimes were due to his disfigurement and the attitude of his associates. So instead of sending the boy to prison he appealed to a local service club to finance an operation and secure for the boy an artificial eye, since his parents were not able to bear the expense, in order to alleviate his handicap. Following this his delinquency ceased. He continued through high school and is now successfully employed. This is just one of scores of similar cases which have been reclaimed by careful psychological and psychiatric study with proper treatment. A juvenile judge in New Jersey reports 500 cases which were successfully handled in this way with only one failure, and he excused that one because of the parents being responsible for the child violating his probation.

Assuming that only 50 per cent of the children guilty of juvenile delinquency can be saved by proper case work and the application of mental hygiene therapy, millions of dollars would be saved and an unbelievable decrease in crime would result.

PERSONS ON RELIEF

The implications are just as alluring in the field of our social agencies as they are in juvenile delinquency. Among those on relief rolls are thousands with inadequate personalities. In the physical examination of large groups of people who were employed on WPA work it was discovered that 85 per cent of them had some form of disability and, assuming that their mental status was as good as that of the men called by the selec-

tive service boards, we can form some estimate of the part that mental disability played in rendering these people economically dependent.

A physical examination of the inmates of the insane asylums of California some years ago revealed that 90 per cent of them had organic ailments which were masked by their mental condition. Poverty plays a part in mental illness as indicated by a recent report by a distinguished psychiatrist which points out that schizophrenia is more prevalent among those who live in city slums than among those who are better housed and in more congenial surroundings. It may be that they live in the slums in the first instance due to economic handicaps resulting from mental inadequacy. These reflections should indicate to us that mental hygiene therapy should have a wide application to that segment of our population which is in the care of and under the supervision of our various social welfare agencies.

MENTAL HYGIENE AND THE PUBLIC SCHOOLS

As evidenced by the Suffolk report [3] already referred to, mental hygiene has its broadest application in the field of public school work. It is unfortunate that, in some sections of our country and especially in our rural areas, school authorities, school administrators, and all too many teachers have no conception whatsoever of the value of mental hygiene as it relates to school problems which arise almost daily. The lack of knowledge of child psychology on the part of so many grade school teachers is deplorable. Annually hundreds of youngsters, mentally normal, are consigned to a life of frustration and failure because their teachers have no conception of child psychology as it affects the child's behavior and school work. No attention is given to their emotional conflicts, their social handicaps, their frustrations, their physical disabilities, their nutritional status, their home life, and privations due to economic conditions, etc. It is so much easier for the mentally lazy and ignorant teacher to label the youngster who needs attention a "problem child" than it is to find out and correct the child's difficulties. As a result, hundreds of mentally normal children are consigned to the rubbish heap to increase the army of the anti-social, feeble minded, insane, juvenile delinquents, and other wards of the state, to say nothing of the distress that befalls the families of these children in disrupting home life and rendering other members of the family unfit for normal social adaptation.

Where they have been adequately financed and staffed by competent personnel, the child guidance clinics operated by public health services have proved invaluable to schools which have made use of their services.

THE MEDICAL PROFESSION AND MENTAL HYGIENE

The medical profession is awakening to the value of mental therapy. Too many physicians for too long have looked upon the psychiatrists and neurologists as the "nuts" among medical specialists. However, since the revelations as to the prevalence of mental illness as revealed by the selective service examinations, and the incidence of the condition in the armed services, the attention of doctors as well as laymen has become centered upon this field in medicine, and it now looms large on the medical horizon. The doctor has begun to realize that all too often he has treated the husband for stomach ulcer when the trouble was due to the wife being a poor cook.

One who has read the book of Dr. Alvarez, *Nervous Indigestion*, cannot escape the idea that all too many people are treated by drug or surgical therapy, without relief, who should

have had mental therapy. It is estimated by those who have made a study of the subject that 50 per cent of all patients seen by physicians are in need of psychiatric advice. Some authorities place it as high as 90 per cent. That the medical profession is awakening to the significance of mental illness and the value of mental therapy is indicated by the number of psychiatric discussions which have recently appeared in the *Journal of the American Medical Association*. One could easily have mistaken a recent issue for a journal of psychiatry. Physicians are availing themselves of the services of mental hygiene clinics where they have been established and the clinics in turn are using the services of the physicians to the mutual benefit of both parties.

PARENTS AND MENTAL HYGIENE

The problem of reaching the parents of children who are in need of mental hygiene therapy presents the most baffling difficulty of the whole program, and yet if real success is to be attained this approach must be made. The Parent Teacher Association offers only one approach. Others will have to be made through the school, the clinic, by lectures, personal contact through social workers, the family physician, or the public health nurse. To say that this part of the program is important is trite. The abysmal ignorance of child psychology on the part of parents is tragic. It is not unreasonable to believe that more children are handicapped by the ignorance of parents in this regard than from any other one cause. The remarkable thing is that so many children escape in spite of the parental handicap. This is too large a subject to enter into here; but permits the recital of a few illustrative cases.

A father had as a teacher when in grade school a man who later taught his children. The teacher used the proverbial rod on the father, which resulted in a permanent dislike of the teacher. This dislike was often expressed by the father in the presence of his children when some of them were in this teacher's room in school. As a result, when one of his boys reached the grade in school taught by this teacher, the child remained in the grade for two years without passing in a single subject. Fortunately after the second year the principal promoted him to the next grade and he left this teacher's room. He then passed all higher grades through the high school as he had done in those below that of the teacher mentioned. He is now a gunner on a destroyer in the United States Navy. This is a case in which a disparaging remark, probably innocently made, so impressed the elastic mind of the child that he lost a year in school and for this loss the teacher was blamed when, as a matter of fact, it was the fault of the parent. This case illustrates two things: first, how a parent can influence the mind of the child and second, how subtle that influence is.

Another is the case of a mentally bright 8 year old girl whose parents were well-to-do. She was an only child and was being reared according to "Holt." She had developed a "tick" and the family physician had advised that she be taken from school because of St. Vitus's dance. The parents described her as "nervous." Drug therapy had been of no value. She was becoming worse. A complete physical and neurological examination was entirely negative except for the tick, which was an exaggerated muscular movement of the eyes, head, neck, and arms.

Upon inquiring into her home life it was discovered that she had not only been brought up on the "book" but she was also being subjected to a strict regimen as to sleeping, eating, and social activities. A wide discrepancy existed between what she was permitted to do, and her associates of her eco-

nomic and social level. Very positive advice was given to the parents to return her to school, remove restrictions as to articles of diet and eating habits, sleeping hours, and social activities. The advice was given in the presence of the child. It was suggested that she be allowed to "run the house." While these suggestions were being made the happy expression on the face of the child contrasted with the distressful look of the parents; however they consented to try. The results were happy beyond our fondest expectations. When relieved of her frustrations the whole syndrome vanished.

In another well-to-do family of excellent social position a son had red, bushy, unruly hair, and in early childhood his face was heavily sprinkled with deeply pigmented rust colored freckles. For a time both parents, as well as the other children who are brunettes, teased him about his unruly hair, its color, and his freckles. Being a visitor in the home, this was noticed by the author over a period of four or five years. One day the father casually remarked that the youngster at the age of 8 was becoming belligerent, disobedient, and incorrigible, to the dismay of the parents. They feared the child would become a delinquent unless something could be done about the situation.

It was pointed out to him that probably the parents and the other children were responsible for the child's behavior. It was suggested that a change of attitude be assumed and that, instead of emphasizing the undesirable differences in the physical features in this child as compared with the other children, they begin diplomatically and not too obviously to stress the distinction of having red hair (his mother's hair was auburn) and freckles, and indicate that they are often associated with a robust, manly physique and aggressiveness in a young man, and other desirable manly qualities. This advice was given about four years ago. Last summer when four Boy Scout troops appeared before a local service club to put on a program, this youngster had been chosen by the scout master to act as master of ceremonies in charge of the entertainment. His freckles were less noticeable, his unruly hair was under control, and he looked magnificent in his Boy Scout dress uniform.

CHILDREN HAVE CRITICAL PERIODS IN EARLY LIFE

One might cite dozens of cases showing how subtle parental influences and home life are. Innocent remarks playfully made may do irreparable damage to the plastic mind and immature personality of the child in the impressionable years of early life. In making their social adjustments in first entering school, children are often severely handicapped by parental admonitions as to how they shall behave under school and playground situations. The "little man" idea of a doting mother may be the cause of her little idol being dubbed a "sissy" when he comes up against the rough and tumble of the playground, whereas if left to his own devices he may establish himself as a hero among his fellows. His reaction to the situation may make or break him.

ECONOMIC ASPECTS OF MENTAL HYGIENE

All of the groups and agencies mentioned need the services which are available through a mental hygiene program, but it has a broad application to the larger aspects of human welfare and associated economic problems, although not more important than those already mentioned.

The cost of the care of those who become public charges is a big item in governmental expenses. It is estimated that crime costs us annually 15

billion dollars, to say nothing of the losses due to theft, embezzlement, fraud, and similar practices. In the matter of curbing or abatement of juvenile delinquency millions of dollars can be saved, to say nothing of saving the youngsters from a life of crime. Experience has shown that mental hygiene clinics have enabled the handling and training of 50 per cent of the feeble minded cases referred to them without sending patients to an institution for care and protection. Every case so treated means a saving of about $7,000. In addition it saves the individual from the stigma of the insane asylum or feeble minded school.

It is estimated that one child in every twenty is destined to spend a part of its life in a mental hospital. In a child guidance clinic 25 to 30 per cent of those presenting a problem can be eliminated and another 33 to 50 per cent can be greatly improved. In one state a child guidance clinic in a health department on a budget of $30,000 saved the state $140,000, annually. In another state it is estimated that, of the patients treated, 15 to 20 per cent would have gone to a state hospital and would have cost the state $583,440 annually. In the same state if the program were state-wide it would effect a saving of $284,452 if only 15 per cent of the institutional cases could be paroled to the clinic.

INCIDENCE AND COST OF MENTAL ILLNESS

For each insane person in our institutions there are ten mentally inadequate outside, or six million. Strecher estimates that one-half of all mental disease is preventable by the application of our present knowledge of mental hygiene, which would mean a saving of as much as $387,500,000.

Our state hospitals alone cost annually $210,000,000, and for prevention we spend less than $3,000,000. Mental cases from World War I have cost us to date over one billion dollars. Each case from the present war will cost from $30,000 to $35,000.

CONCLUSION

Dr. Menninger[5] says: "It is no mere figure of speech to say we are experiencing a world-wide psychosis. It should arrest the interest of all organized medicine. It should demand our attention to direct an attack on the causes and take immediate measures for treatment and prevention."

Does not a mental hygiene clinic in every public health department on both a state and county level offer the most hope for a solution of the problem of mental illness?

BIBLIOGRAPHY

Amick, Andrew J. Growing Children—Our Responsibility. *West Virginia M. J.*, July, 1944.

Haugen, Gerhard B. An Approach to the Public Health Mental Hygiene Problem. *Pub. Health Rep.*, 58:32 (Aug.), 1943.

Jackson, J. Allen. An Approach to a Rural Mental Health Problem. *Pub. Health Rep.*, 52:49 (Dec.), 1937.

Lewis, N. D. *A Short History of Psychiatric Achievement*. Norton, 1941.

Lott, George McClelland. Mental Hygiene Services in Rural Areas. *Pub. Health Rep.*, 57:31 (July 31), 1942.

Menninger, William C. *J.A.M.A.*, 125:16 (Aug. 19), 1944.

Vogel, Victor H. Mental Hygiene in the State Health Department. *Pub. Health Rep.*, 56 (Jan.), 1941.

——— Our Inadequate Treatment of the Mentally Ill as Compared with the Treatment of Other Sick People. *Pub. Health Rep.*, 56 (Oct.), 1941.

——— Administrative Organization for Mental Hygiene. *Pub. Health Rep.*, 57:15 (Apr.), 1942.

Indices and Standards for Child Health Services

MYRON E. WEGMAN, M.D., F.A.P.H.A., AND
MARJORIE T. BELLOWS, F.A.P.H.A.

Department of Health, New York, N. Y.

CONTINUOUS supervision of health during the infant and preschool years is generally accepted as an essential factor in the promotion of optimal growth and development. Quantitative standards may be used as an index of the completeness of this supervision although they cannot, of course, measure the quality of service rendered which must be evaluated independently or coincidentally. It should be possible, however, based on knowledge of the processes of growth and development and of infant needs, to set up certain standards of service as guides for administrative planning and control of services.

In the most recent revision of the *Evaluation Schedule* of the American Public Health Association and the *Health Practice Indices* [1] derived from the reports submitted on this form, emphasis is placed, rightly, on measuring service in a community as a whole rather than limiting the record to that supplied by a particular agency. The present discussion, however, will be limited to the activities of an organized clinic and to the measurement of two specific quantitative phases of those activities—the proportion of infants in the community cared for in the clinic and the amount of service given those infants.

Data bearing on these two points usually come from counts made at the end of each clinic session, summarized over various periods, monthly, quarterly, and annually. Many different forms of summaries of health department activities are in use but the one probably best known is the *Tabulation of Health Department Services*,[2] approved by the State and Territorial Health Officers, U. S. Public Health Service, and the U. S. Children's Bureau. The part of this report dealing with infant and preschool services is shown in Chart 1. Only two lines refer directly to medical service to infants in clinics, lines E-1 and E-3. The report is limited to a calendar year and therefore line E-1 includes all the individual children who made at least one visit during the calendar year of the report. Thus, an infant who visits the clinic in December, 1942, for the first time is counted under E-1 as an "individual admitted" on the 1942 report and when he makes a revisit the following January he is counted as an "individual admitted" on the 1943 report. Certain limitations of this information must be recognized, especially in answering the first question under discussion, i.e., the proportion of the infants in the community cared for in the clinic. The maximum potential case load for a calendar year is presumed to be the reported births.

It is obvious that in many cases one child will be counted in two calendar years. It is possible that as few as half of the "individuals admitted to med-

CHART 1

U. S. Department of Labor
CHILDREN'S BUREAU
Washington

Social Security Act
Title V, Part 1: Maternal and Child-Health Services

Maternal and Child-Health Services
Administered or Supervised by State Health Agency

Activities Series MCH-51
(Revised 1939)

State of ..... *Report for quarter ended* ..... (Month) ....., (Day) *19..* *Date submitted*.....

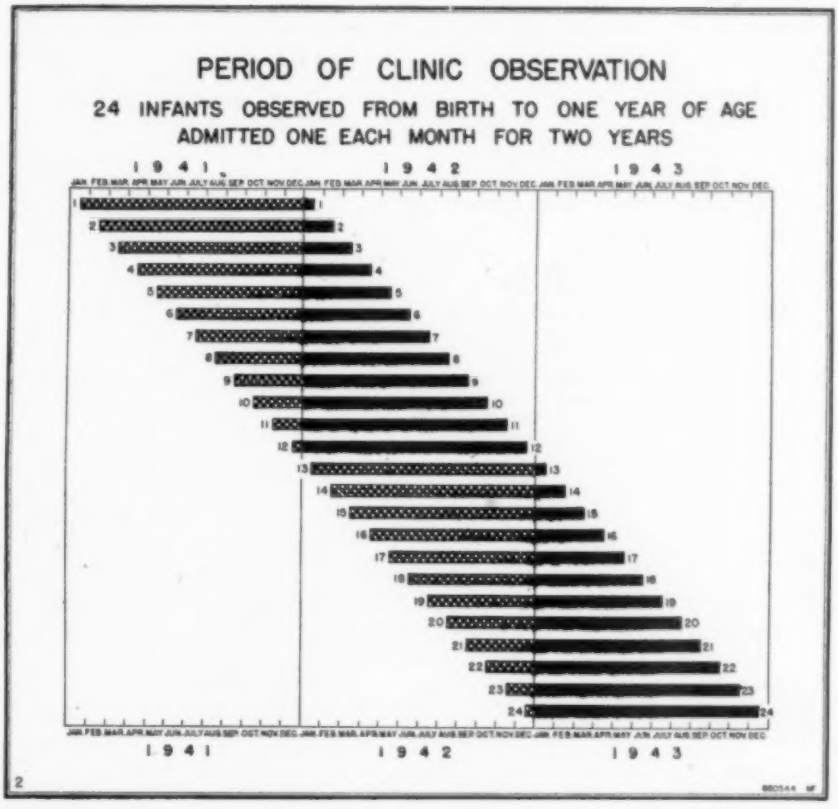
Signatures ..... (Director, State division of maternal and child health) ..... (Executive officer, State health agency)

Type of Service (1)	*Total (including MCH demonstrations)* (2)	*MCH Demonstrations (Included in Col. 2)* (3)	(4)	(5)
INFANT HYGIENE				
Individuals admitted to medical service (E 1)...				
Individuals admitted to nursing service (E 2)....				
Visits to medical conferences (E 3).....				
Field and office nursing visits (E 5, 6).....				
PRESCHOOL HYGIENE				
Individuals admitted to medical service (E 8)...				
Individuals admitted to nursing service (E 9)...				
Visits to medical conferences (E 10).....				
Field and office nursing visits (E 12, 13).....				
Inspections by dentists or dental hygienists (E 14)				
Attendance at infant and preschool classes (E 20)				

ical service" during a particular calendar year will actually be making the first visit in their lives and therefore really be "brand new." Chart 2 illustrates schematically the maximum possibility of the period of clinic observation for 24 children. Each bar represents one child admitted at birth, and remaining in clinic during the entire first year of his life. The admission of one child each month of the calendar year implies of course, a stable clinic population and an even flow of admissions. The checked part of each bar represents the portion of the first year of the child's life in the calendar year of his birth, when he is considered "brand new." Conversely, the solid part of the bar represents that portion of the first year in the succeeding calendar year when he is classified as a "previous year" case.

Clearly there are just 12 children admitted to service for the first time in their lives in each year. On the other hand, between January 1 and December 31, 24 different infants received service and this is the numuber which would be reported on line E-1 of the form previously mentioned. Obviously, it is not in order to use this count of total admissions—total different individuals served—to compare with the potential case load as measured by the births which took place during that year. If all the infants in a community were admitted to service and all attended throughout their first year of life, the proportion of births admitted to clinic would, by this method, be 200 per cent. The correct ratio is that of "brand new" infants to registered births. Although this ratio is now in use in many places where a separate

CHART 2



count of "brand new" is made, the figures are not directly obtainable from the federal reports.

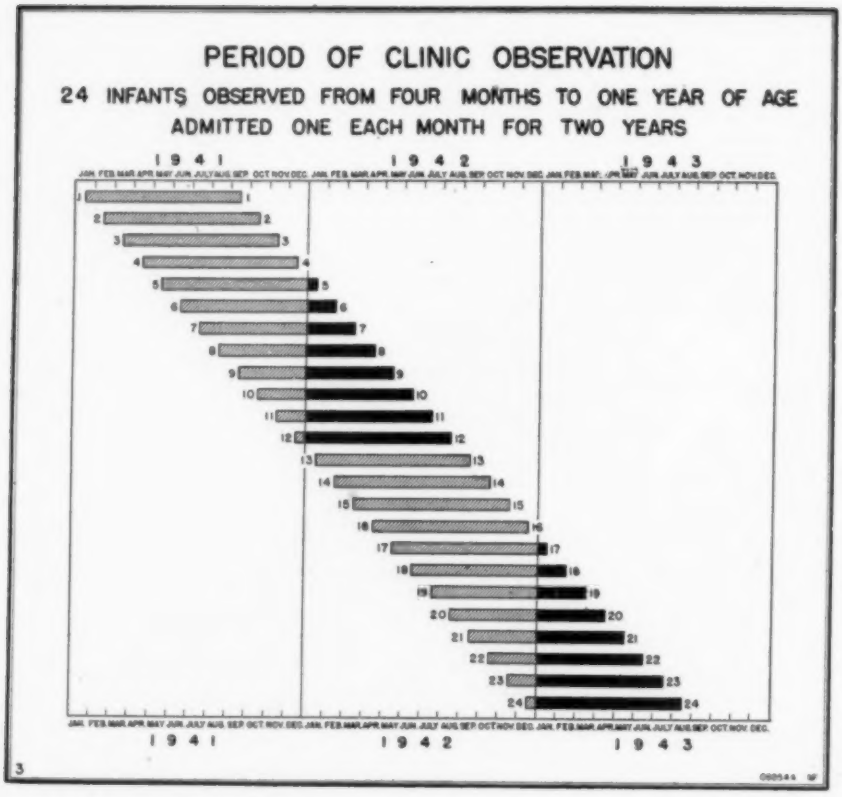
The error which may result from the use of the incorrect ratio is illustrated in a report of infants admitted to nursing service published by the Children's Bureau,[3] which listed one state as having a rate of 117.6 admissions per 100 births. This was explained as "an apparent error in reporting admissions" but the basic error is the comparison of total admissions, drawn from 2 years' births, to the birth figures for 1 year.

Another instance is the tabulation of "per cent of infants under medical supervision" reported in *Health Practice Indices*.[1] The directions for computing these indices allow the percentage to be obtained by dividing the total number of infants who were under supervision during the first year of life by the reported births during that year. This must result in overstatement, and casts doubt on the high figures from some communities.

A study of Chart 2 raises the possibility that the number of "brand news" might be estimated at 50 per cent of the total admissions. This chart, however, illustrates an extreme since the average period during which an infant is under observation is usually far less than 12 months.

In a sample of clinic cases to be discussed later, the average period of observation in the clinic during infancy was approximately 8 months. This affects the ratio of "brand news" to total

CHART 3



admissions as shown in Chart 3, which is drawn on the same basis as Chart 2 except that the length of the bar represents 8 months instead of 12 months. One child is still admitted to clinic each month. There are therefore still 12 brand new cases during the calendar year. The total cases seen, however, are only 20, since the shorter duration of clinic observation has allowed only 8 to be carried over from the previous year. Thus the ratio of brand new to total infants seen becomes 12 to 20, or 60 per cent, instead of 12 to 24, or 50 per cent.

There appear to be three factors influencing the ratio of brand new to total infants seen:

1. *The mean age at admission.*
2. *The mean age at termination.* Some children will drop out before reaching their first birthday, although all others will be terminated automatically at 1 year when they are classified as preschool. As the period of observation (i.e., the difference between mean ages of admission and termination) becomes shorter, the ratio of "brand news" to total infants seen becomes greater.
3. *The relation between "brand news" and terminations.* A new clinic in a hitherto untapped area, where the registration is increasing rapidly, will have a far higher proportion of "brand news" than one in an area from which there is a steady exodus of population and a consequent decreasing clinic population.

It appears that the ratio of "brand news" to total infants seen may have practical usefulness as a supervisory index of the activities of the clinic but all of the implications are not clear at present. In practice the proportion

brand new seems to be relatively stable in a large area. For a number of years New York City, like many other communities, has kept a separate count of these two categories—" brand new cases " and " total infants seen "—and it has thus been possible to study the actual experience in this regard. Chart 4 shows the figures and the ratio of brand new to total infants seen for two clinics in the Borough of Manhattan, one at Kips Bay and one in East Harlem, for 3 successive years. It will be seen that while the range of variation is not too great, the figures do change. If it were impossible to make a separate count of " brand news " a figure of approximately two-thirds of the total infants admitted would not be too far wrong, at least for New York City. This figure may not be the same in all communities nor is it necessarily stable. Even in New York City, exact counts must be made for any detailed analysis or year-to-year comparison.

A method of estimating the number of brand new cases from quarterly reports of total admissions has been suggested by the Children's Bureau.[3] It is based on the fact that most first visits of cases originally admitted the previous year take place during the first quarter of the year. For any year, the number of previous year carryovers may be estimated by subtracting the average of the number of admissions in the fourth quarter of the previous year and the second quarter of the current year from the admissions in the first quarter of the current year. This approximation is valid, of course, only if clinic populations are stable.

The foregoing discussion leads to this conclusion: To measure the completeness with which potential candidates are brought under the care of the infant health clinic the index must be the ratio of the number of brand new infants seen during any period to births registered in the community during the same period, or to that portion of the births believed to be potential clinic material. Clinic reports should therefore include a count of such " brand news," preferably as a routine.

It is beyond the scope of this paper to discuss standards for proportion of children served since they will vary from one community to another. Many factors are involved, including the social and economic composition of the population served and the availability of service from other sources.

The second question proposed at the outset was that of evaluating how much service is given to a child. It may be wise to point out again that the total quantity of service does not necessarily bear a relationship to the quality and that any conclusions are limited accordingly. Line E-3 of the Tabulation of Health Department Services and corresponding figures in other summaries give the total number of clinic visits. It would seem important to know the average number of visits per child. If total visits were divided by

CHART 4

Ratio of Brand New Cases to Total Infants Seen

East 69th Street and East 101st Street Clinics, N. Y. C., 1940–1942

	East 69th Street			*East 101st Street*		
	1940	*1941*	*1942*	*1940*	*1941*	*1942*
Brand new cases	521	497	433	307	401	332
Previous year cases	211	263	234	119	165	228
Total infants seen	732	760	667	426	566	560
Ratio—Brand new cases: total infants seen	.71	.65	.65	.72	.71	.59

total admissions, the result would be only the number of visits made during the calendar year per child seen. In no sense does it tell how many visits are made during the child's first year of life.

In assessing the degree of approach to any set standard of visits per infant, one may attempt to answer one or both of the following questions: first, what, on the average, was the number of visits per child's first year of life, regardless of the length of time he was officially registered under clinic supervision; second, *at what rate,* during the period of time between clinic admission and termination, was the average child attending clinic? An answer to the first question tells how many times infants were seen during their first year and can be set against an arbitrary standard. If the second question could be answered it would indicate whether or not infants are being seen at the desired rate even though they may not be registered early enough or held under clinic supervision sufficiently long to give complete standard service for the first year of life.

To examine the relation between the actual experience and the summary clinic reports, a study was made of a sample of records from the Child Health Station in the Kips Bay-Yorkville Health Center in New York. Records were selected by extracting from the appointment sheets for every other day throughout the calendar year 1942 names of all the infants who registered as brand new during this year. Date of birth, date of admission to clinic, number of visits made in each of the calendar years 1942 and 1943, and date of termination were tabulated.

The results, based on records for 202 children, demonstrate (Chart 5) that during the first year of their lives they made a total of 1,165 visits. Of these, 894 were made during the calendar year in which the child registered (1942) and 271 during the succeeding year (1943). The 271 visits were made by 128 children who carried over into the following year. If the clinic registration remained constant, approximately the same situation should have existed in 1942 for cases carried over, that is, about 271 visits would have been made by children originally registered in 1941. This would mean that the ratio of the total number of visits recorded for all infants during a calendar year to the number of brand new cases actually admitted that year, approximates the average number of visits per infant during his first year of life.

Thus, by counting the total number of visits during 1942 and dividing by the actual number of brand new children, the mean number of visits per child during infancy may be estimated. The routine clinic summary for 1942 records 433 brand new infants and 2,671 total infant visits, a ratio of 6.2, while in the sample under discussion (Chart 5), the average number of visits was 5.8.

The goal set in New York City is 9 visits per child and it would appear, therefore, that the result is considerably short of the objective. However, as was pointed out above, this average does not take into account the lateness of registration or the time of termination. This particular group was actually under observation an average of not quite 8 months per child. Thus, during the period of observation the children were visiting at a rate of 9 visits during the year. This might be interpreted as meaning that the staff of the station were achieving their objectives as far as supervision of children while under observation is concerned, but that there is room for improvement in fostering earlier registration or preventing terminations or both. It seems obvious that in interpreting the significance of the mean number of visits per child, it is desirable to consider the length of the period of observation.

CHART 5

1,165 Visits to Clinic

Made by 202 Infants Admitted as Brand New in 1942

East 69th Street Clinic, N. Y. C.

	1942		1943	
	Infants	*Visits*	*Infants*	*Visits*
Brand new cases	202	894		
Infants carried over to next year (previous year cases)	*128*	*271*	128	271
Total	*330*	*1,165*		

However, no simple way has yet been devised of tabulating on daily report forms the necessary data for estimating this period.

SUMMARY AND CONCLUSIONS

1. Two indices which may be used as measures of accomplishment may be readily obtained from routine summaries of clinic service:
   a. The proportion of potential infant cases which is being given service.
   b. The average number of visits the cases under care are making during the first year of their lives.
2. The proportion of the potential case load served may be obtained by deriving the ratio of "brand new" infants to births registered in the community.
3. An estimate of the average number of clinic visits during the first year of life may be obtained by deriving the ratio of total visits of infants to the number of "brand new" infants.
4. It is suggested that a separate count of "brand new" infants is essential in addition to the count of total infant visits presently required on the U. S. Public Health Service and Children's Bureau summary forms.

REFERENCES

1. *Health Practice Indices*, American Public Health Association, New York, 1943, 116 pp.
2. *Tabulation of Health Department Services.* Revised Instructions. Approved by the State and Territorial Health Officers, United States Public Health Service, and the United States Children's Bureau, 1940, 22 pp., mimeo. (See also *Pub. Health Rep.*, 51:1236, Sept. 4, 1936.)
3. Services of State Health Departments for Mothers and Children, 1940. *Social Statistics Supplement No. 1, The Child.* Vol. 6 (Sept.), 1941, 18 pp.

"Eye Bank"

Formation of The Eye Bank for Sight Restoration, Inc., which will collect and preserve healthy corneal tissue from human eyes for transplanting to blind persons who have lost their sight because of corneal defects, has been announced. The organization, national in scope, has been incorporated under the laws of New York State and 22 leading hospitals in New York City are now affiliated with it; in addition, 20 outstanding ophthalmologists throughout the country will serve in an advisory capacity. Headquarters are at 210 East 64th Street, New York, N. Y.

Officers elected recently are Stanley Resor, *President;* Dr. R. Townley Paton, *Vice-President;* Cyril B. Hartman, *Secretary;* Walter C. Baker, *Treasurer;* and Mrs. Henry Breckinridge, *Executive Director.*

Industrial Waste Treatment and Control*

LORING F. OEMING

Sanitary Engineer, Michigan Stream Control Commission, Lansing, Mich.

THE disposal of industrial process wastes creates a wide variety of problems involving one of our most valuable natural resources, namely, water. Uncontrolled waste discharges have the capacity of substantially impairing and often destroying natural stream values. Correction of abuses in waste disposal is the prerequisite to the most constructive use and maximum development of surface waters. It is not surprising, therefore, that industrial waste treatment occupies a key place in water policy administration.

The many sources of industrial waste problems and the conflicts and injuries which they encompass are presumed to be known to the sanitary engineer and industrial hygienist. However, there exists a broader basis than this for a mutual interest in the subject by the two professions. The industrial hygiene engineer will frequently encounter problems involving waste disposal in his industrial contacts. Plants utilizing oil, acid, cyanide and caustic compounds present both occupational and pollution hazards. His knowledge of production practices gained in conducting surveys of industry can be valuable when relayed to the sanitary engineer engaged in obtaining improved waste disposal.

Adoption of control measures by industry to meet the requirements of either of these groups occasionally raises a problem requiring attention of the other. For example, the installation of wet processes for elimination of dust in foundries makes it necessary for the sanitary engineer to require sedimentation of the water vehicle in order to prevent sewer blocking and filling of stream channels. Conversely, the industrial hygiene engineer will be concerned with the disposal of hydrocyanic acid gas produced by the cyanide waste treatment method described later in this discussion. Control programs in both fields of endeavor can be advanced, therefore, by closer coöperation and wider exchange of knowledge and experience.

After nearly three years of war, it is needless to recount in detail its effects on our control programs. Experiences in control of stream pollution have doubtless been duplicated in obtaining control of occupational hazards. Accelerated production tempo has intensified and accentuated many pre-war problems. Newly established war industry has created additional ones. The means for solving the problems in many instances have not been available due to labor and material shortages and construction restrictions imposed during this period.

Some experiences in Michigan with industrial pollution and control measures applied in specific instances during this period may prove helpful in solving problems elsewhere, both in the present and post-war periods.

The chemical industry in Michigan

* Presented at a Joint Session of the Engineering and Industrial Hygiene Sections of the American Public Health Association at the Seventy-third Annual Meeting in New York, N. Y., October 4, 1944.

uses the state's extensive brine resources as a basic raw material in the manufacture of a diversity of products. After processing for the extraction of the desired chemical components, the brine becomes a waste product. Its principal constituents are the chlorides of calcium, sodium, and magnesium with concentrations in excess of 200,000 p.p.m. as Cl.

The problems arising out of its disposal to streams are manifold. It imposes artificial hardness upon public waste supplies which cannot be removed by softening processes. Increased costs of boiler operation and corrosion of plumbing arise when chloride concentrations exceed 100 p.p.m. Fresh water fish apparently resist varying concentration without injury up to 4,000 p.p.m.[1]

Limited quantities of waste brine have been injected into underground formations through abandoned production wells or especially drilled disposal wells where a sufficiently porous stratum can be found. Use for dust laying on county roads has also been practised to some extent. But the greater portion still finds its way into the streams. Impounding and controlled discharge during periods of high stream flows represents the most effective means of minimizing brine pollution at present.

Erection of plants by the Defense Plant Corporation at Ludington and Marysville, Mich., for extracting and processing magnesium created two additional wartime sources of chemical waste having origin in brine. The control measures evolved were designed to furnish the maximum of protection to established water supply, commercial fishing, and recreational interests.

At Ludington, the waste brine is pumped through 12 miles of 14″ diameter steel pipe line to an isolated region along the Lake Michigan shore. The point of discharge into the lake is some 600′ from the shore in 16′ of water. During slightly over a year's operation of the plant, five surveys have been made of the area by means of a conductivity cell to observe the behavior of the wastes. Contrary to expectations, the brine did not diffuse. However, location of the outlet did provide protection originally contemplated. The brine, having a specific gravity of 1.18, remains on the lake bottom in approximately its original concentration. Flow of the brine stream in a southerly direction is induced by a slight lake current which is not influenced by wind and wave action. The brine layer has a thickness of from 1′ to 3′ and the total area covered accounts for 85 per cent of the total volume discharged.

Extraction of magnesium at Marysville by electrolysis of the magnesium chloride produced at Ludington results in the formation of large volumes of hydrochloric acid wastes. These are discharged to the St. Clair River through a submerged multiple outlet pipe designed for the reaction of acid with sufficient river water to effect neutralization in the minimum space of time. The quantity of river flow required for this purpose represents a small part of the entire 200,000 cu. ft. per second of river discharge.

Failure of the system to prevent pollution injury resulted from the substitution of vitrified clay for rubber lined steel pipe during construction. Breaks in the diffusion line have developed from time to time. The unequal distribution of wastes created zones of high acid concentration. Fish continually came to the surface in a stupified condition, furnishing a sumptuous feast for flocks of gulls and terns. However, on the few occasions when the line was in good repair, satisfactory results were obtained and no fish distress was evident. Sufficient protection was provided for downstream water supplies at all times. Replacement of the distribution line

scheduled for late 1944 has been postponed by the recent closing of the plant.

Phenolic type wastes are objectionable by reason of the taste and odor imparted to the receiving water. Public water supply developed from sources containing as little as 1 part in 1,000 million parts of water when chlorinated generally becomes unpalatable to the consumer.[2] The flesh of fish caught in waters subject to this type of pollution exhibits taint which renders it inedible. In Michigan, the tainting effects have constituted an economic loss to the commercial fishing industry as well as injury to sports fishing interests.

An outstanding record in the treatment of phenolic wastes has been made by the Dow Chemical Company at Midland, Mich. In 1937, a treatment plant was constructed with provisions for clarification and filtration through blast furnace slag. In 1940, two additional filters duplicating the initial installation were placed in operation to provide treatment for new sources and increased volumes of waste. Further enlargement of the facilities became necessary in 1942 under accelerated wartime production. WPB approval, predicated upon downstream water supply protection, was obtained for supplemental treatment of the filtered wastes by the activated sludge process. Since completion of the additions in the spring of 1943, removals of 4,500 pounds of phenol per day from an average 15 million gallons daily waste flow have been obtained. Notwithstanding this performance, water supply and commercial fishing interests continue to suffer from this phenol and other organic residues.

An additional war-connected problem has arisen out of the manufacture of synthetic rubber. Thiokol wastes have extremely high oxygen demand and caustic alkalinity. Experimental treatment on a semi-plant scale by aeration, using diffused air coupled with recirculation of sludge, has met with some success.

The cracking of alcohol to styrene, an ingredient of Buna S rubber, produces wastes which are odor-producing and toxic to fish life. Evaluation of the pollutant characteristics with respect to fishes has been made by the Institute for Fisheries Research at Ann Arbor, Mich.[3]

The polymerization of butadiene and styrene to produce Buna S in a plant on the St. Clair River has been traced as the source of an odor problem in the water supply of the City of Detroit. Treatment and control methods await the outcome of research now under way.

Wastes containing acid and cyanide from metal working and plating industries often are the cause of wholesale fish destruction. When discharged to municipal sewage plants, they frequently disrupt and seriously impair the sewage treatment function.

Dumping of the contents of vats when the sulfuric acid concentration is between 3 and 4 per cent is common in metal pickling practice. Neutralization with lime and recovery of acid or by-product copperas are among the control methods available.

Cyanide wastes are a constant threat to animal and aquatic life. Cattle killings have occurred where stock had access to cyanide-bearing streams. Fish life is completely snuffed out at concentrations above 0.5 p.p.m. of CN.

Ash residue from the molten cyanide used in case hardening has contributed toxic concentrations of CN to streams by way of surface drainage through dumping grounds.

Impounding of the wastes has long been demonstrated as an inadequate method of control. Removal of cyanide from solution as hydrocyanic acid gas by decomposition with sulfuric acid has been practised successfully for a num-

ber of years at Chevrolet Motor Company's plant in Flint, Mich. This method has also been included in the treatment facilities provided by the Ford Motor Company, at its Willow Run bomber plant. It will interest the industrial hygiene engineer to know that the hydrogen cyanide hazard is prevented by blowing the gas through a vent stack some 40′ high.

Research by the DuPont de Nemours Company has recently developed a process for converting cyanide to nontoxic cyanate by the reaction with sulfur compounds. The method is not applicable where the treated wastes enter sewage plants using chlorine for sewage disinfection. Chlorine reverses the reaction and restores toxic properties.

Chromium compounds are notable for the yellow color imparted to streams and their germicidal effect upon organisms essential to sewage sludge digestion and natural stream purification. Much of the development in treatment methods must be credited to the research program conducted by the State Water Commission of Connecticut.

At the Ford Motor Company's Willow Run plant removal of chromium is accomplished by application of ferrous sulfate to reduce the hexavalent chromium to trivalent form. Neutralization with lime then precipitates chromium hydroxide as sludge which is placed in a lagoon.

Oil wastes are common to both metal working and oil refining industries. Rapidly changing production, brought about by the war, intensified the oil waste problem in many of our automotive plants.

In addition to its detrimental effect on fish and wild life and its nuisance value, oil discharged to streams is a waste of a war-vital resource. In aggravated conditions, such as at Flint since the war, the surface of the river becomes ignited, imperiling riverside buildings, bridges, water supply impounding dams, and other property.

Devices which have been installed for oil and water separation vary widely in design and effectiveness. Separators embodying the features of design developed by the American Petroleum Institute for refinery application have proved successful in the forging industry as well. Adequate operation and maintenance is of prime importance in the performance of any of the separating devices.

With few exceptions, the accomplishments in control of pollution from the paper industry have been limited to recovery of fiber and re-use of waste waters. Experience has demonstrated the feasibility of reducing fiber losses to 1 per cent of paper production and waste flows to 20,000 gal. per ton of product at a financial advantage to the mill. However, as a means of waste control, the benefits derived are offset in considerable measure by opening up closed systems for discharge of wastes during periodic mill cleanups and changes in grade and color of product.

In many instances, satisfactory stream conditions cannot be maintained by internal mill improvements alone. Treatment by settling with or without the aid of chemical precipitation then becomes necessary.

Settling of board mill wastes preceded by flocculation with alum has produced an effluent with suspended solids content and turbidity below that of the river at the Monroe Paper Products Co. mill. Clarification of the paper machine wastes in a mill using higher grade pulp has been obtained by floatation methods at the Sutherland Paper Company in Kalamazoo. A high grade quality of effluent is being produced at a lower cost for structures than would be expended for conventional flocculation and settling units to accomplish the same result. Re-use of

the clarified waste conserves dwindling ground water resources in the area. Its operation appears to hold promise of extended application in the post-war period.

Mill effluents containing de-inked and straw pulp wastes provide ample opportunity for improved disposal practice. Development of methods for reducing their oxygen demand and solids concentrations entails further research.

Treatment and disposal of spent liquors from sulfate and sulfite pulping processes presents serious technical and financial problems for the industry. The so-called sulfate black liquors are generally processed for recovery of chemical components. However, varying quantities of weak liquor enter the mill wastes and produce objectionable taint in fish. Fractional precipitation of sulfite liquors for by-product recovery by the Howard Process is reported as successful at the Marathon Paper Company's mill, Rothschild, Wis. Production of ethyl alcohol from sulfite liquor appears to offer little hope of reduction in stream pollution since it is reported that the waste problem is only modified, not eliminated.[4]

A research program covering all aspects of waste problems in the pulp and paper industry is now being formulated on a national scale by the National Council for Stream Improvement under sponsorship of the industry. Its progress, findings, and conclusions will be awaited with utmost interest by pollution control authorities.

The policy expressed at a regional meeting of the Council in Chicago recently gives encouragement that the stalemate in the industry can presently come to an end, and by the same token presents a real challenge to the industry.

After practical methods of disposal are developed, however, there still remains the question whether management will accept the benefits of scientific investigations and proceed without further delay in bringing the wastes under control.

Wastes produced by the wartime development of food dehydration have caused acute injury and obnoxious odor nuisances in some localities. Potato dehydration wastes have been particularly serious offenders in Michigan. The principal polluting constituents are skins, trimmings, and starch losses resulting from the preparation of the potato for processing. Control has been supplied in one instance by segregation of the concentrated lye peeling and starch washer wastes for treatment at a municipal sewage plant. The balance of the wastes is sufficiently improved by fine screening and plain sedimentation to permit its discharge to the water course. Disposal by seepage and evaporation is practicable in some climates, but in our state treatment methods must be found.

The utilization of beet sugar processing equipment in dehydrating potatoes for cattle food under contract with the Commodity Credit Corporation during recent months has increased the scope of the waste problems in this industry. The industry unfortunately failed to recognize the pollution potentialities of these wastes and did not make provision for their treatment. The attention of federal agencies involved in the contractual arrangements has been directed to the problem and efforts are being made to avoid recurrence of past conditions through study and research.

The possibilities of by-product recovery for pollution control were recently demonstrated at a dextrose plant operated by the Doughnut Corporation of America at Holland, Mich. Conversion of high protein flour to dextrose was accompanied by the wasting of some 4 tons of protein daily to a highly developed resort lake. Recovery of the protein for meat extender and manufacture of monosodium glutamate has

eliminated 95 per cent of the pollution load. Expensive treatment was avoided and recovery has become an essential part of the operating economy.

In addition to the foregoing, methods are available for handling many of the wastes from other industry. The *Industrial Waste Guides* prepared by the Public Health Service in connection with the Ohio River Pollution Survey present an authoritative compilation of current treatment and disposal practices in existence today. The solution of many remaining problems awaits the completion of experimental and research programs now under way. However, with all the present knowledge plus developments promised, a strong state agency with adequate personnel is needed to obtain conformance with the law. It has been repeatedly found that failure to adhere to specifications in the installation of approved treatment processes results in disillusionment for polluter and injured interest alike. From our experience it will still be necessary to continue investigations, and inspect and supervise the installation and operation of treatment plants if our water resources are to be adequately protected.

REFERENCES

1. Hubbs, Carl L., and Washburn, George N. *Report No. 863.* Institute of Fisheries Research—The Toxicity of Michigan Oil-Well Brines to Fishes. Apr. 19, 1943.
2. Public Health Service Drinking Water Standards. *Pub. Health Rep.*, 58, 3:69–111 (Jan. 15), 1943.
3. Hubbs, Carl L., and Washburn, George N. *Report No. 810-A.* Institute for Fisheries Research. Toxicity Tests on Wastes from the Styrene Process. Jan. 5, 1943.
4. Hanson, Fred S. Ethyl Alcohol from Sulphite Waste Liquor. *Paper Trade J.*, Dec. 10, 1942.

Engineers and Sanitarians in Local Health Service

Local Health Units for the Nation, soon to be published as the report of the Association's Committee on Local Health Units says "a reorientation in the field of environmental sanitation and a clarification of objectives under professional leadership would result in better sanitary work with fewer workers of non-professional grade and at less cost than at present."

In making its study of existing local health services and its planning for complete coverage of the nation by at least a minimum of such services, the committee found that in 1942 the various full-time and part-time local health departments employed a total of approximately 5,500 workers in the field of environmental sanitation. This represents an average for the United States of approximately one worker per 24,000 population, although many areas had no such service. Of the total not much more than 10 per cent were reported to be professionally trained.

In order to staff on a minimum basis the 1,200 units through which the committee suggests that local health service can be economically administered in the United States, a total of 5,800 workers is recommended, an increase of only 6 per cent over the number found employed in 1942. Professional personnel, preferably public health or sanitary engineers, however, would be more than tripled by the committee and would represent approximately one-third of all workers, and provide at least one professionally trained worker in each unit. This recommendation is reinforced by the Association's Committee on Post-War Sanitary Engineering Problems, which points out that the maintenance of public health must make use of "engineering health service which utilizes the materials and forces of nature in the adjustment of the environment to man."

Integrating Nutrition Education and Activities in the School Program*

MARGARET S. CHANEY, PH.D.

Professor of Home Economics and Chairman, Department of Home Economics, Connecticut College, New London, Conn.

NUTRITION education is a means to better living—healthier, happier, and more satisfying living." This is the opening sentence of a bulletin of the Connecticut State Department of Education, entitled A Program of Nutrition Education in the Elementary School,[1] prepared in 1943 by nutritionists and educators in that state.

This concept of nutrition education may raise questions in the minds of some people but should serve as a challenge to those who are responsible, to a great extent, for the success of the school health program in this rapidly progressing era.

There is no need to spend time proving that, despite the fact that this country has the food required to feed its people adequately, nevertheless inadequate diets are quite common. A recent bulletin of the National Research Council, entitled Inadequate Diets and Nutritional Deficiencies in the United States,[2] lists studies which show the widespread prevalence of moderately deficient diets and of subacute or chronic states of malnutrition. Those who question the truth of this fact are apt to base their opinion on inconclusive or unreliable data. The weight of a child as compared with standard weight-height-age charts is not now accepted as a sole means of judging nutrition. Nor is "pep," which is so frequently due to nervous tension, nor freedom from actual recognizable disease. Too frequently large-scale, insufficiently controlled surveys lead to conclusions actually not proved.

The report of the National Research Council mentioned above discusses the significance of dietary deficiency states during growth and development, and the relationship of diets low in certain nutrients to easy fatigue, irritability, lack of "pep," poor appetite, and decreased physical and mental efficiency. Of especial interest to those concerned with the teeth are the statements made concerning dental decay. As confusing and complex as this condition is, there are certain conclusions which the writers of this bulletin believe are worthy of emphasis. They say, "There is sufficient work of good caliber to indicate that attention to diet can not only decrease the prevalence of caries, but give some protection against the further development of that already present. Also, it is equally evident that malocclusion, uncleanliness, bacteria, too many sweets, and unknown factors are involved in the process."

The need for nutrition education as a means to healthier living is evident. And as for a happier and more satisfying living, there too nutrition education plays an important rôle. Good health, ability to work, to play, to rebound from fatigue, to recover speedily

* Presented at a Joint Session of the American School Health Association and the Food and Nutrition and the Dental Health Sections of the American Public Health Association at the Seventy-third Annual Meeting in New York, N. Y., October 4, 1944.

from illness, to resist infection—these make for happiness and satisfaction in life, and these are the logical outcome of an optimal state of nutrition.

But nutrition education *per se* does not necessarily result in better health, more happiness, greater satisfaction in life. It is the job of those who are teachers, whether they be classroom teachers, dentists, nurses, dental hygienists, or parents, to study the problem of how to make nutrition education "take." They must not only know nutrition subject matter and keep up with this ever advancing science, but also must know how to put it across so that it will actually function in the youth's day-by-day living. More to the point than what the child can recite is what he does. Not only should he know the value of green and yellow vegetables, the need of his body for calcium, the importance of sufficient fuel or calories for his body engine, but, more important, he must eat every day a diet sufficient both in quality and in quantity. He must have a wholesome attitude toward food and health habits, an increasingly intelligent understanding of the reasons for these practices, and an awareness of their relation, not only to his own state of being, but also to that of his family, his friends, his community.

There are several reasons why nutrition education may fail to function as it should. Unless the administrator safeguards against these dangers he cannot hope for the success which is so essential. First is the common lack on the part of the teacher of nutrition knowledge; more and more teachers' colleges are including nutrition as one of the required subjects, but too often, still, it is omitted altogether or taught as a unit in a science course by someone who is not trained in nutrition. In-service teachers, especially those who have held certificates for some years, need summer school, evening school, or correspondence school courses so that they may learn the current facts and the newer methods of teaching them to their pupils.

Second, there is a tendency for nutrition education to be taught in the same manner and at the same level throughout the whole school system, without consideration of the changing needs, interests, and abilities of the children. Plans should be made for different age levels and, although the objectives may be fundamentally the same throughout, the factual content of the course and the activities and experiences included should vary and become increasingly more challenging as the child grows older.

Other factors than age must be considered also. The socio-economic status of the children's families has a significant bearing on nutrition teaching. Economically privileged groups often have greater needs for the development of wholesome attitudes toward food, whereas children from lower income families are apt to need help in actually securing the food which the home may not afford or which may not be supplied there because the mother is working. Nationality must be taken into account, advantages taken of the good food choices and preparations in homes of foreign extraction and consideration made of the effects of certain substitutes which change the excellent diet of the foreign land to a poor one here. The needs of urban and rural children may vary, as well as their interests and experiences. Facilities and equipment are influential factors in nutrition teaching; with simple materials and a little money much can be done to make nutrition teaching function more fully. Thus it may be seen that a stereotyped curriculum may be the reason that this important field of knowledge does not fulfil its utmost potentialities.

A third reason why nutrition education may not accomplish its aim of

greater health, happiness, and satisfaction is its failure to reach into the home. Education in the school, where the child spends only about one-fourth of the hours in the day, must be carried into the home where it is to be put more fully into practice. This objective may be accomplished largely through the activities included in the teaching at school, and by securing the coöperation of the family through Parent-Teacher-Association meetings, and by visits of the parents in the school and of the teachers in the home.

The planning of the nutrition program should be a coöperative project involving the combined efforts of the teachers who will use the curriculum, of nutrition and other science authorities, of education supervisors, the parents, and the children. Unless all of these groups are included there is a chance for failure in the program.

The school is the ideal place for a well planned, up-to-date nutrition program. Its set-up is conducive to learning, to habit formation, and to the performance of activities which are a natural part of nutrition teaching.

The integration of nutrition with other school work is much to be desired. In studying a foreign country, not only the foods produced should be investigated but also the food customs of its people, their physical status and probable dietary problems. A study of the community in which the children live provides opportunities galore in a functioning nutrition program. Some authorities believe that nutrition should not be taught at a set time of the day, or as a special subject. Many nutritionists favor its inclusion as such in the school program because of their belief that otherwise it may be so subordinated that it will be neglected and will fail to function. They have found from experience that children really enjoy the study of the foods they eat in relation to their state of nutrition, and that geography, art, and arithmetic can be incorporated as easily into a nutrition lesson as it can fit into the other subjects.

The physical facilities and the entire program of the school should favor wholesome living. Good posture should be encouraged at all times and in every conceivable way. Strain and undue fatigue should be prevented. Cleanliness, ventilation, and lighting should be given due consideration. Provisions for adequate medical care, and for frequent dental and physical examinations should be made A school lunch should be provided for those who need it.

The feeding of the child, primarily a home responsibility, should frequently be taken over in part by the school. The distance of the school from home, the shortness of the noon recess, and the complicated home set-up with the mother away or too involved to prepare and serve an adequate meal to her children—these are all logical and legitimate reasons for the school lunch program. But an equally or even more important reason for the school's taking over the feeding of a meal to children is that this activity offers an excellent medium for nutrition education. Here is an opportunity for learning through experience, with enough repetition so that habits may be formed. The school lunch is also a means of safeguarding the child's health. During the last school year, according to Lee Marshall, Director, Office of Distribution of the War Food Administration,[3] school lunches benefited more than four million children in thirty-one thousand schools. Government funds are again this year available to schools and child care centers, to pay part of the food cost, with equipment, labor, and supervision furnished by the state and by local, or civic organizations. Often private agencies carry the expense and management of the school lunch until enough public opinion is

aroused to provide community funds for the support of this worth while project. Thus indirectly may be the story of nutrition spread through the community.

As in the case of nutrition education as a whole, so with the school lunch program, its success depends upon its sound organization and efficient administration. School officials should back the program to the full; frequently, parents and trained community groups may contribute to its smooth execution. Supervision by a trained home economist is important. She will see that, above all, the children are supplied nourishing, properly prepared food, that the environment is favorable for its utilization, and that nutrition education goes hand in hand with the feeding. Posters on the wall, frequent check-ups on trays, public acknowledgment of wise choices, individual guidance when it seems wise, a really genuine interest in each child—all these help to make the school lunch program one for positive health. The lunch should not be a source of profit and it should be available without discrimination to all children who do not return home at noon, whether or not they can pay for it. One of the great advantages of the school lunch as a part of a functioning nutrition education program is the ease with which its values penetrate into the home. Finicky eaters and fussy mothers alike become convinced when the group puts its stamp of approval on the meal.

A broad nutrition program is an integral part of the school system, one in which the home and the community also participate, one which meets the current interests and needs of the children so that it will function in the promotion of a healthier, happier, and more satisfying way of life.

REFERENCES

1. Connecticut State Department of Education, Division of Instruction, Hartford. A Program of Nutrition Education in the Elementary School. *Bull. XXVII*, Mar., 1943.

2. National Research Council, National Academy of Sciences, Washington, D. C. Inadequate Diets and Nutritional Deficiences in the United States. *Bull. 109*, Nov., 1943.

3. Marshall, L. 5,000,000 for Lunch. *Consumers' Guide X*, 2 (Aug.), 1944.

Civilian Hospitals Have Million More Patients

An increase of a million in the number of patients admitted to civilian hospitals in this country was reported by Dr. Donald C. Smelzer, President of the American Hospital Association, when announcing May 12 commemoration of National Hospital Day. He reported that civilian hospitals are waging a two front war in a nation requiring their services at home and abroad. Their records shows 54,000 hospital trained nurses and 60,000 hospital trained doctors, many thousands of technicians serving in the armed forces and admission of 12 per cent of the American population to community hospitals in 1944 for civilian hospital care. Dr. Smelzer said that, despite a drop in the total number of voluntary hospitals, the bed capacity in them had actually grown by several thousands. Shortages of personnel and supplies and the increased demand for hospital care had required patience and understanding from administrators and the communities.

May 12 was observed as the 125th anniversary of the birth of Florence Nightingale, who initiated modern hospital practice.

American Journal of Public Health
and THE NATION'S HEALTH

Official Monthly Publication of the American Public Health Association

Volume 35 July, 1945 Number 7

C.-E. A. Winslow, Dr.P.H., *Editor*
Leona Baumgartner, M.D., *Associate Editor*
Arthur P. Miller, C.E., *Associate Editor*
Mazÿck P. Ravenel, M.D., *Editor Emeritus*
Martin Frobisher, Jr., Sc.D., *Associate Editor*
James E. Perkins, M.D., *Associate Editor*
Augusta Jay, *Editorial Associate*

Editorial Board

Reginald M. Atwater, M.D.
Chairman, and Managing Editor
Ira V. Hiscock, Sc.D.
Kenneth F. Maxcy, M.D.
Henry E. Meleney, M.D.
Alton S. Pope, M.D.
C.-E. A. Winslow, Dr.P.H.

GAMMA GLOBULIN FOR MEASLES

PROGRESS made in identifying and separating the priceless individual components contained in the human blood stream is one of the most fascinating chapters of recent physiology. The process of blood transfusion dates back to the 17th century; and long before the present war a first step in fractionating the constituents of the "life blood" was taken by the separation of the red cells from the plasma, so that each of these two elements could be preserved for its specific uses. The further analysis of the plasma was initiated by researches sponsored by the Rockefeller Foundation and Harvard University and, since August, 1941, coördinated by the National Research Council and supported by a contract recommended by the Committee on Medical Research between the Office of Scientific Research and Development and Harvard University.

A recent report on this work by E. J. Cohn [1] indicates the splitting of the plasma proteins into more than a dozen specific components. The major fraction (58 per cent) contains the albumens, used for the treatment of shock, hypoproteinemia, and edema. The component in which we, as public health workers, are particularly interested is Fraction II of the gamma globulins; for it is this fraction (including only 5 per cent of the total plasma proteins) which contains the specific immune bodies against measles.

The progress in practical immunization against this disease has passed through three earlier stages, involving, successively, the use of convalescent serum, pooled normal adult serum, and placental extract. Fraction II of the gamma globulins is twenty-five times as potent as plasma in its content of measles immune bodies. It has been shown (Stokes, Maris, and Gellis,[2] Ordman, Jennings, and Janeway [3]) that these gamma globulin antibodies are effective in the prevention or attenuation of measles and that their use "constitutes the safest and most effective agent available for the prophylaxis of measles" (Janeway [4]). It is a source of gratification that this material is now available to local health officers and in many states

has already been placed in their hands. For this happy consummation we owe a debt of gratitude to the American Red Cross which has made its stock of pooled human plasma available, and to the commercial firms which have provided the extracted gamma globulin at cost. Gamma globulin should be particularly valuable in certain New England, Middle Atlantic, and Mountain states, which had a low prevalence in 1944. The South Atlantic and Pacific states had, on the other hand, a rather high prevalence last year.

The injection should be given to the exposed child, preferably, on the fifth day after exposure, which is practically convenient since this is the day when the original source of infection usually develops a rash. At this stage, a dose of 0.02–0.025 ml. per pound of body weight will in most cases produce a mild attack with subsequent active immunity; while a dose of 0.075–0.1 ml. per pound will generally confer complete protection. The former result is, of course, the one at which we should normally aim with a healthy child. Reactions, according to Janeway, occur in less than 2 per cent of children injected and are ordinarily limited to local soreness or swelling and fever. The public health nurse would do well to urge the use of this protective agent in appropriate cases.

It is interesting to speculate on what may happen when the use of this prophylactic against measles becomes general. Since active immunity will be developed only in families where there is a measles case and only in children who receive the ideal minimal dose of globulin, it seems probable that the amount of immunizing material present in pooled human blood will gradually and steadily diminish. Perhaps by that time, the physiological chemist can synthesize the essential globulins. In any case, we can cross that bridge when we come to it. We have an ample supply of gamma globulin, containing immune substances, for 1945–1946. We should use it to the full extent.

REFERENCES

1. Cohn, Edwin J. Blood Proteins and Their Therapeutic Value. *Science*, 101, 2612:51–56 (Jan. 19), 1945.
2. Stokes, J., Jr., Maris, E. P., and Gellis, S. S. The Use of Concentrated Normal Human Serum Gamma Globulin (Human Immune Serum Globulin) in the Prophylaxis and Treatment of Measles. *J. Clin. Investigation*, 23:531–540 (July), 1944.
3. Ordman, C. W., Jennings, C. G., Jr., and Janeway, C. A. The Use of Concentrated Normal Human Serum Gamma Globulin (Human Immune Serum Globulin) in the Prevention and Attenuation of Measles. *J. Clin. Investigation*, 23:541 (July), 1944.
4. Janeway, Charles A. Clinical Use of Products of Human Plasma Fractionation. *J.A.M.A.*, 126, 11:674–680 (Nov. 11), 1944.

SUPERCHLORINATION AND "BREAK-POINT" CHLORINATION

WHEN the process of disinfecting water by the use of chlorine was first introduced at Boonton, N. J., in 1908, the presence of what was assumed to be a safe excess of residual chlorine was determined by tests which did not distinguish between true free chlorine and chlorine combined with nitrogenous compounds in the form of chloramines. It was assumed that residual chlorine estimated in this way was a valid measure of disinfecting power. Since about 1925, however, it has been recognized that much greater amounts of chlorine are necessary in order to remove the odors present in certain supplies, because in that year Sir Alexander Houston utilized high doses of chlorine in London to oxidize taste- and odor-producing compounds, especially phenols. The term

"superchlorination" was used for this procedure because the doses required to remove odors were well in excess of those currently employed for disinfecting purposes.

Superchlorination for taste and odor control was introduced on this continent by Norman Howard and has been used for a number of years at Toronto. The precedent established by Houston and Howard included the practice of dechlorination to remove the high residuals remaining in the treated water following superchlorination; therefore, the influence of this treatment procedure upon conditions in the final distribution system was not studied until later.

The practice of superchlorination for the elimination of tastes incidental to the presence of chlorophenols was utilized chiefly in certain areas where phenol substances from by-product coke ovens were present in the water to be treated. Secondary advantages of superchlorination such as the oxidation of iron, organic matter, etc., for improved coagulation and more especially for improved disinfection secured through the use of higher doses of chlorine, were discussed in technical literature but did not receive serious attention until the late 1930's.

At this time, C. R. Cox of the New York State Department of Health and others pointed out that current dosages of chlorine, utilized in "marginal chlorination," while destroying typical *Escherichia coli*, might not kill related coliforms or other organisms which were potential factors in the causation of gastroenteritis. Researches, conducted largely by the members of the Wallace & Tiernan Company staff, revealed new and important facts in regard to the chemistry of chlorination. These studies showed: (1) that where chlorine was added in progressively increasing amounts to a given water the chlorine residual (as then determined) at first rose in proportion to the amount of chlorine added; (2) that at a certain concentration the addition of further chlorine was accompanied by a sharp *decrease* in chlorine residual; and (3) that, after reaching a minimum—the "break-point"—chlorine residuals rose with further additions of chlorine. It was discovered that the chlorine residual occurring with a dose below that producing the break-point consisted of chloramines rather than free chlorine and that the decrease apparent at the break-point represented complete oxidation of the amines and other nitrogenous substances. Only beyond the break-point did the residual represent free chlorine which is the really effective disinfecting and deodorizing agent. Ideal results can only be attained when this type of residual is produced. Such chlorination is essentially a scientifically controlled superchlorination. Griffin and Chambeflain [1] have recently presented striking demonstrations of the great improvement attained at typical plants by the use of this procedure. In one instance increase of chlorine from 1.44 p.p.m. to 5.49 p.p.m. diminished the proportion of gas-forming organisms from 43 per cent to 5 per cent. In another case an increase from 1.06 to 2.03 p.p.m. decreased the proportion of gas-formers from 38 per cent to 4 per cent.

It was also found that the chlorine reaction-products, formed when the chlorine doses were less than those required to secure complete oxidation, led to chlorinous tastes, whereas active free residual chlorine such as hypochlorous acid was practically tasteless even when present in relatively high concentrations, although this active free chlorine did produce a slight chlorine odor. This of course established taste and odor control on a sounder basis than previously had existed.

Finally the Laux "flash test" for active free chlorine was developed as a simple means of ascertaining whether residual chlorine was present as hypochlorous acid or its equivalent, or as chloramines or other chlorine reaction-products of

lower oxidation potential and hence lower disinfecting action. The Laux test, however, was only qualitative. Quantitative comparison with the color standards was difficult since the intensity of color occurring immediately after the reagent is added to a sample increases at a rate too rapid to obtain reproducible readings during the first 30 second period. Because of this situation Gilcreas and Hallinan of the New York State Division of Laboratories and Research developed the orthotolidine-arsenite test to distinguish between active chlorine and chloramines. The appropriate use of this test also discloses any false value incidental to the presence of manganese, nitrites or iron.[2, 3] Attention is called to the discussion of this subject in the report of our Committee on Water Supply in this issue of the *Journal*.

As a result of these successive developments water works officials now have at their disposal a treatment process (in use at some 200 plants in the United States) which will aid in the destruction of taste- and odor-producing compounds by oxidation, and which will result in much more effective disinfection. The active chlorine residuals so secured are stable because reducing substances have been previously oxidized. Therefore this procedure makes it possible to maintain free active chlorine residuals throughout a water distribution system after the treatment has been used for a sufficient period to oxidize organic matter coating the inner surfaces of the system. It may take months for this to occur but ultimately some free active residual chlorine can be maintained throughout.

As a result of this situation, more effective control of the bacterial content of water passing through distribution systems is possible than previously was the case. Also, the effectiveness of disinfection by break-point chlorination is such as to result in the elimination of coliform organisms as well as the much more resistant lactose-fermenting anaerobes which otherwise would produce positive presumptive tests when samples of the water are examined. While the elimination of these positive presumptive tests may not have a scientific significance in so far as intrinsic potability of the water is concerned it does furnish a very practical means of controlling disinfection because break-point chlorination can be so supervised as to result in a treated water containing no lactose-fermenting organisms. This of course eliminates the necessity of confirming numerous positive presumptive tests, and hence simplifies bacteriological control.

No advance in this imperfect world is without its hazards and uncertainties. Break-point chlorination is no exception as to the rule. Its efficiency in disinfection is beyond doubt; but odor-control presents real—though temporary—problems. When break-point chlorination is first introduced, free chlorine is consumed in stabilizing sludge in settling basins, and organic matter in filters and in the pipes of the distribution system. This may require under such conditions (and also at times of sharp variation in the organic content of the raw water to be treated) excessive doses of chlorine which lead to consumer complaints. After the break-point method has been in continuous use for a sufficient period, the first type of difficulty will disappear; and the problems of adjustment to later variations will be solved by experience and operating skill.

It is apparent that the use of a chlorine dosage sufficient to maintain an adequate residual of free chlorine (rather than chloramines) can secure far more reliable sanitary safety than has been hitherto attainable; and it should greatly advance taste and odor control, oxidation of iron and manganese, removal of odors due to algae and improvement in the appearance of water containing organic coloring matter. All in all, this technique represents perhaps the most significant

advance in disinfection of water supplies since the introduction of chlorination at Boonton in 1908.

REFERENCES

1. Griffin, A. E., and Chamberlin, N. S. Bacteriological Improvements Obtained by the Practice of Break-Point Chlorination. *A.J.P.H.*, 35, 3:199–210 (Mar.), 1945.
2. Hallinan, F. J. Tests for Active Residual Chlorine and Chloramine in Water. *J. Am. Water Works A.*, 36:296, 1944.
3. Gilcreas, F. W., and Hallinan, F. J. The Practical Use of the Ortho-tolidine-arsenite Test for Residual Chlorine. *J. Am. Water Works A.*, 36:343, 1944.

ALUMINUM VS. SILICA

IT is now seven years since Denny, Robson, and Irwin at Toronto [1] first pointed out that the addition of metallic aluminum prevented the solubility of silliceous materials *in vitro* and reported that, when rabbits were exposed to quartz dust, they could be protected against silicosis by the addition of 1 per cent of aluminum. Two years later,[2] the same authors presented more detailed and convincing evidence of the importance of this discovery. They demonstrated that metallic aluminum, when hydrated, reduces the toxicity of quartz by flocculation and by adsorption, but chiefly by covering the quartz particles with an insoluble and impermeable coating. They exposed a large series of rabbits for 12 hours a day to natural quartz dust (containing a variable but generally small amount of aluminum); to a mixture of quartz dust and aluminum; and to natural quartz dust for 12 hours plus a 40 minute dusting with aluminum. The percentage of aluminum actually present in the lung was determined.

The tables presented show (when the data are combined and reclassified) that, of the rabbits exposed for less than 200 days, those with less than 0.6 per cent aluminum in the lung showed a 36 per cent incidence of fibrotic change while the corresponding figure for those with over 1.0 per cent aluminum was only 12 per cent. Of animals exposed for periods over 200 days, those with less than 0.6 per cent aluminum showed an incidence of fibrotic change of 79 per cent while for those with over 1.0 per cent aluminum the corresponding figure was only 13 per cent. The investigators note that this influence of aluminum will help materially to account for the puzzling fact that quartz dust from certain country rocks has failed to produce silicosis when it might have been expected to do so (an observation which goes back at least to Haldane in 1917). Recently, Crombie, Blaisdell, and MacPherson [3] have attempted to apply a similar procedure to the treatment of human silicosis. In a series of 34 cases of uncomplicated silicosis with measurable pulmonary disability, this treatment was associated with definite clinical improvement (decrease of dyspnea, cough, pain, and fatigue), although the men continued their employment and exposure to silica dust.

In France, Policard [4] has reported that aluminum dust shows a similar protective action against lesions of the cornea produced by introducing silica dust into the eyes of rabbits. In England, Belt and King,[5] using intratracheal insufflation of aluminum with rats found no protection against silica and also reported harmful effects due to the aluminum dust alone. They did not observe hydroxylation of the aluminum and the conditions of the experiment are so different that they do not bear directly on the Canadian work.

In the United States, when silicosis is in question, we always want to know

what Dr. Gardner thinks. His conclusions strongly support the general conclusions of Denny and his colleagues. Gardner, Dworski, and Delahant [6] have independently demonstrated the protective effect of a colloidal hydrate of alumina which, at Saranac, has proved more efficacious than metallic aluminum powder. They find that "The gelatinous alumina and the quartz may be introduced into the animal body in separate suspensions and even by different pathways without causing silicosis, provided that the inhibitor and the irritant ultimately localize in the same phagocytic cells"; and that "Injection of gelatinous alumina after the quartz causes resolution and healing of immature silicotic tissue reactions," although fibrous nodules do not disappear. An interesting bit of evidence was contributed by the unexpected resistance of supposedly unprotected "quartz control" animals which led to the discovery that rafter dust in the quartz room contained nearly 2 per cent of Al_2O_3, probably introduced by accident from the aluminum room. An amount of alumina far in excess of what might be contemplated for human therapy was harmless to normal animals but had an unfavorable influence on the development of tuberculosis, suggesting caution in using the procedure in the presence of active tuberculous lesions. The authors conclude that "confirmed experimental evidence proves beyond question that aluminum and aluminum hydrate probably in amorphous state, specifically inhibit fibrous reaction to quartz, and that their administration will prevent progression of silicotic lesions and cause retrogression in immature tissue responses. Inhalation is probably the only effective method of administration. In the doses recommended for human therapy (5 to 30 minutes a day or less frequently), no harmful results are anticipated. Aluminum therapy should be administered only under close medical supervision and should not be used to the exclusion of recognized methods of dust control. Aluminum hydroxide possesses certain theoretical advantages over metallic aluminum and deserves serious clinical trial."

REFERENCES

1. Denny, J. J., Robson, W. D., and Irwin, D. A. The Prevention of Silicosis by Metallic Aluminum. I. *Canad. M. A. J.*, 37:1 (July), 1937.
2. Denny, J. J., Robson, W. D., and Irwin, D. A. The Prevention of Silicosis by Metallic Aluminum. II. *Canad. M. A. J.*, 40:213 (Mar.), 1939.
3. Crombie, D. W., Blaisdell, J. L., and MacPherson, G. The Treatment of Silicosis by Aluminum Powder. *Canad. M. A. J.*, 50:318 (Apr.), 1944.
4. Policard, A., and Rollet, J. *Compt. rend. Soc. de Biol.*, 132:100 (Oct. 21), 1939.
5. Belt, T., and King, E. J. Failure of Aluminum to Prevent Experimental Silicosis *J. Path. & Bact.*, 55:69, 1943.
6. Gardner, L. W., Dworski, M., and Delahant, A. B. Aluminum Therapy in Silicosis. *J. Indust. Hyg. & Toxicol.*, 26:211 (Sept.), 1944.

Shellfish*

Engineering Section

FOR several years, the Shellfish Committee of the Engineering Section, American Public Health Association, has discussed with representatives of the Public Health Service and various shellfish producing states the idea of preparing a shellfish manual which could be used throughout the industry to standardize accepted practice. Such a manual would make for uniformity of enforcement by clearly indicating what constituted satisfactory compliance with Public Health Service Minimum Requirements. The Public Health Service has been sympathetic to this idea, and has encouraged the committee to assist in the preparation of such a manual.

A preliminary draft of a proposed manual was distributed in November, 1943. Some 7 months later, in June, 1944, the committee sponsored a meeting at Atlantic City at the annual meeting of the National Shellfisheries Association, the Oyster Growers and Dealers of North America, and the Oyster Institute, at which suggestions and criticisms, based on a brief trial period, were presented.

A few weeks later, at the request of District 4, U. S. Public Health Service, and of regulatory authorities from southeast and Gulf Coast states, the chairman of your committee and the committee member representing the Southern Branch of the American Public Health Association, met at Atlanta, Ga., in a two day meeting with representatives of these states, and discussed details of the manual with them. This group adopted a number of resolutions, addressed to the Public Health Service, recording their opposition to: (1) floating; (2) repacking; and (3) enforcing the revised manual prior to the termination of the war. They also contributed constructively to the rephrasing of the manual.

Following these two meetings, the Public Health Service held a hearing at Washington, D. C., during the latter part of July, at which representatives of the industry expressed their views of the manual and of the revisions suggested at both the Atlantic City and Atlanta meetings.

The final revision of the manual has not yet been issued by the Public Health Service, but probably will be before long in order that experience with its provisions may be obtained during the present active shellfish season.*

The meetings held at Atlantic City, in June, 1944, attracted much interest. On June 6, members of the committee attended a meeting, held under the auspices of the directors of the Oyster Institute. To this meeting were invited health officers and members of the industry. The chairman of the meeting appointed a committee consisting of

* The *Manual* was issued October 18, 1944, to become effective January 1, 1945.

* Progress Report of the Committee on Shellfish.

COMMITTEE ON SHELLFISH (Engineering Section)

Organized 1928. Published reports: *Year Books* 1934–1935, 1935–1936, 1936–1937, 1937–1938, 1938–1939, 1939–1940, 1940–1941, *A.J.P.H.*, July, 1944.

members of the shellfish industry and requested that the committee meet with our committee on June 7 to present industry's viewpoints on the proposed manual. Below are recorded the high lights of these discussions, all of which centered around the proposed Public Health Service Shellfish Manual.

PROPOSED PUBLIC HEALTH SERVICE SHELLFISH MANUAL

Much discussion at all these meetings centered around the desirability of placing the manual in effect during the coming season. Objections were raised on the grounds that because of the scarcity of inspectors and materials, present standards should be tolerated until after the war, when more nearly normal conditions had returned.

A good deal of discussion centered around the suggestion that whenever closed shellfish areas could not be effectively policed, such areas should be depleted of their shellfish every two years, if necessary. It was argued that depletion was an expensive process and was not practical. No alternative solution was offered. Instances were cited where depletion has been carried out at very little expense to the state by permitting bonded purchasers to buy both market size shellfish and those not of market size from closed areas and relay them in approved areas.

In the discussions which took place on June 5 and 6, a good deal of time was devoted to the wording of sentences which defined what constituted satisfactory compliance with requirements. In general, there was great difficulty in agreeing on *definite* statements. Instead, it seemed necessary to word statements in broad, general terms which would permit some latitude of interpretation. From the standpoint of an enforcing agency, statements in specific and definite terms are desirable so that only one interpretation can be placed upon the language. The portions of the shellfish manual describing what constitutes satisfactory compliance with requirements were intended to leave only one interpretation.

Even defining such terms as "wet storage" and "floating" offered difficulties because these terms have, at present, different meanings in different geographical areas. This emphasizes the need of stating in the manual what is meant by these terms, and what the attitude of the regulatory authorities should be toward the practices so defined.

There was difficulty in agreeing that standards should be set for testing the safety of shellfish when the shellfish themselves were being examined instead of the waters in which they were grown. It was also indicated that it would probably be advisable to have standards for shucked oysters different from those for shucked clams and mussels.

Among the suggestions which were believed to be of value was one that the Public Health Service should hold seminars on shellfish sanitation matters similar to the seminars it sponsors on milk and restaurant sanitation work. These seminars have a high educational value and tend to bring about a uniformity of understanding and enforcement procedures and to remove many sources of misunderstanding which otherwise arise in shellfish regulatory activities and practices.

It was also suggested that the Public Health Service should prepare an ordinance for use by shellfish consuming states; that such ordinance could require certain items of sanitation which would prevent deterioration and adulteration of the products after they had left the sources of production. Of particular interest were such ideas as requiring that shellfish be packed immediately after shucking into tightly sealed cans which would not be opened before they reached the ultimate consumer, and that such cans of raw

shucked shellfish be labeled indicating the date before which the shellfish fish should be consumed. It was suggested that a standard code for dating cans should be worked out by the Public Health Service and the shellfish industry. It was suggested that the Council of State Governments could assist in bringing about a universal demand from consumer states that shellfish be shipped only in cans sealed at the point of shucking. It was stated that if these requirements, should be adopted by consuming states, they would greatly accelerate progress in shellfish sanitation.

The group seemed to be particularly interested in breaking up the practice, which apparently prevails in some consuming centers, of retailing raw shucked shellfish from a crock or other containers to which both shellfish and water are added. This results both in adulteration of the product and in perpetrating a fraud upon the consumers. It was also pointed out that in some interior cities, it is believed that some repacking of shellfish now takes place and that there is no adequate supervision of such repacking by interior health authorities.

It was pointed out that improvements in shellfish sanitation could best be brought about by consumer interest and that purchasers of shellfish could most effectively raise the standards of shellfish sanitation by specifying their requirements. Some of the larger purchasers, such as the chain grocery stores, are already requiring, in some instances, that shucked shellfish be packed in family size containers, on which is recorded, usually in code, the date when the container was packed.

A good deal of discussion centered around the repacking of shucked shellfish in producing states. It was believed inadvisable at the present state of shellfish sanitation, and because of the present emergency, to prohibit the repacking of shucked shellfish but to enforce such safeguards of the repacking processes as might be necessary to protect the product adequately, in spite of the great practical difficulties heretofore encountered. Some details regarding the practices prevailing in the industry where repacking is done were recounted and strongly supported the belief that repacking, as it is now practised in certain producing states, is in violation of sound sanitary practices and should therefore be discontinued.

In the meeting in the afternoon of June 7 with the members of the committee from the industry, statements were made by industry representatives that some of the returnable containers, in which market oysters had been shipped to the Baltimore or the Washington areas, were returned containing materials which indicate that the container had been used for purposes other than those connected with the shellfish industry, and were not properly cleaned before being returned. It was suggested by members of the industry that where the enforcement authorities encounter returnable containers, which were not suitable for use because of deterioration or damage, the state regulatory authorities should be given authority to summarily destroy such containers when they were encountered. This suggestion, however, it was pointed out, was not new since efforts have been made in the past to enforce it, but very many difficulties were interposed when the destruction of unserviceable containers appeared to be imminent, with the net result that very few containers were destroyed and no improvements were made in the practices involving the use of returnable containers.

Some discussion resulted regarding the advisability of closing mussel and clam areas when laboratory examinations disclosed the presence of poisons

in certain concentrations. So far, no one was able to cite any fatal cases on the East Coast due to soft shell or hard shell clams. However, it was felt that some recognition should be given to the presence of the danger, and in areas where serious situations are believed to exist careful studies should be encouraged. It was suggested that the Public Health Service should do some research on this problem but representatives of the Service stated that the Public Health Service does not feel that it can justify devoting resources and funds in wartime to the investigation of a problem in which no fatalities have occurred in view of the pressing and urgent research problems directly connected with the war effort.

It was recognized that on the Pacific Coast, clam poisoning is a problem and that it may also become one on the Atlantic Coast.

Discussions indicated that requiring the substitution of shucking containers with perforated sides and bottoms for water-tight containers could not be satisfactorily justified as a universal requirement throughout the industry at this time. Certain difficulties of cleaning such containers seem to exist.

The suggestion that sorting of shucked shellfish be prohibited on the shucking bench, if it is accomplished by utilizing two or more different containers to receive two or more different sizes of shellfish, was discussed. Such sorting, as now practised, introduces delays in cooling the shellfish. It was pointed out that if the requirement that shucked stock be cooled to 50° F. or less within 2 hours after shucking was enforced, the details regarding the manner of sorting would be taken care of automatically. It was agreed that whenever the inspector encountered sorting on the bench, he would have justification for special investigation into the length of time required to cool shucked shellfish.

A good deal of discussion revolved around the idea that only one-piece metal shucking knives should be permitted. It was argued that such knives are several times as heavy as the two-piece knives with a wooden handle and that they are more costly, and that at the present time, material for their manufacture could not readily be obtained. Stainless steel knives were reported to be unsatisfactory because they break readily and do not resist salt water.

A suggestion that shucked shellfish should not be permitted to come into direct contact with ice during their processing in the packing room was ruled out on the basis that practices in the packing room could be readily controlled to the point where significant risk was not present, and that any risk remaining would be offset by the benefits gained from the rapid cooling of the shellfish made possible by this practice.

At the meeting with the industry, at Washington last July, the question was raised by the Public Health Service as to whether it would not be better for the Service to discontinue its endorsement of shellfish sanitation measures enforced in the various states since there seemed to be so much criticism on the part of shellfish producers of the requirements laid down by the Service. There was general disagreement with this idea, both from the state regulatory authorities present and from the industry. The statement was made that certain other food products, notably milk, did not move freely in interstate commerce because there was no interstate standard; that the manual was not as formidable as it had been pictured; that it should be studied some more and the effective dates for its enforcement should be met in the future.

The spokesman for the industry summed the situation up by saying the industry *does* want a manual, desires

continued collaboration with the Public Health Service until industry is satisfied with the reasonableness of requirements.

Your committee endorses the requirements stated in the shellfish manual as prepared on September 1, 1944, believing that they are based on sound public health principles, and believes that the Public Health Service should insist that these requirements be carried out to a degree sufficient to warrant its continued endorsement of state shellfish certifications of interstate shippers.

L. M. FISHER, C.E., *Chairman*, U. S. Public Health Service, Chicago, Ill.
L. M. CLARKSON
JOSEPH B. GLANCY
CHARLES G. HAMMANN, SR.
F. GARDNER LEGG
RICHARD MESSER
JOHN O'NEILL
SOL PINCUS, C.E.
EDWARD WRIGHT

Laboratory Service in Local Health Departments

In proposing laboratory personnel for the 1,197 suggested units of local health administration to cover the United States, *Local Health Units for the Nation** outlines no universal pattern. It recognizes the wide variety of present goals and performance, as well as the wide variety of methods possible for achieving either limited or maximum objectives. In many states present practice or future plans call for service to many or all local health departments through the state laboratory or its branches. In a number of the states it is the practice for local departments to purchase laboratory service from existing approved commercial or official laboratories.

Because laboratory units are expensive both in personnel and equipment, the committee suggests that for a minimum service, particularly in units with populations of less than 100,000, the state laboratory and its branches can be most economically used.

For 12 states, no local laboratory personnel is recommended. Here the state health officers have indicated that the 278 local units involved can be served by the respective state laboratories and their branches now in operation or in prospect. In 20 states the same practice is recommended for 153 of the 478 units, and in the remaining states laboratory personnel is recommended for each of the 441 units. However, the committee believes that, because of the small sums presently available for local health service in many states, there might well be an expansion of state service in this area rather than development of local laboratories.

For 766 units with a population of 97,300,000 the total number of workers suggested for local laboratories is 3,535—about 12 per cent professional workers such as bacteriologists, and the remainder almost equally divided between trained technicians and unskilled workers. It is the thought of the committee that except in larger units of 100,000 or 200,000 population, professional supervision will be furnished by the state laboratory as well as assistance in the more complicated diagnostic procedures. It believes this to be a sounder practice both technically and financially than to secure professional leadership on a part-time basis or with below standard compensation that cannot attract scientists of prime competence.

* Emerson, Haven, M.D., and Luginbuhl, Martha, M.A. *Local Health Units for the Nation*, Report of the A.P.H.A. Subcommittee on Local Health Units. Published by the Commonwealth Fund, 1945, $1.25.

Water Supply

Engineering Section

BECAUSE of war conditions it was not considered advisable to attempt any study requiring the collection of statistical data, the circulation of questionnaires, etc. Therefore we have endeavored this year to appraise wartime developments in connection with public water supplies which appear to have a peacetime significance.

ADMINISTRATIVE PROBLEMS

The dislocation occasioned by the employment of technical personnel in the armed forces probably will continue for some time. There are practically no sanitary engineers, sanitary chemists, etc., now in training. Every effort should be made to coöperate with technical schools in publicizing opportunities in sanitary and public health engineering so as to attract capable students who will prepare for permanent careers in this field. One aspect of this field has received too little attention, namely, the attractive position of filtration plant chemist or superintendent. Certain western schools have emphasized such careers through training at engineering experiment stations and at filtration plants operated by the schools. This need should be coördinated with advances in civil service practice and with the merit system procedures of this Association.

NEW EQUIPMENT AND MATERIALS

Current literature is filled with references to new equipment, materials, and processes, some of which obviously are not backed by sound manufacturing programs for the immediate future. It is evident, however, that the very marked advance incidental to the war construction may revolutionize materials, equipment, and even processes, and that an open minded approach to new developments should be adopted to minimize the time lag in the application of new ideas. This is especially necessary in connection with developments outside of the field of water supply which, however, may have a direct application to this field. For instance to quote Mr. Goudey of this committee:

> The military forces have been requiring the development of fire-resistant chemicals for weed control at airports, railroad right-of-ways, oil lines, and power lines. It has been necessary to resort to chemical means largely because of man power shortage. Two such compounds have been developed which are widely used by the military forces for this purpose, namely, Nox-weed and ammonium sulfamate. Nox-weed is a special formula containing sodium chlorate but with boron and other substances added for fire-proofing qualities. The chemicals ultimately wash off the vegetation from rain and are no longer fire resistant. Both compounds are safe to use for marginal weed control at reservoirs and will even kill small trees. These chemicals have been successfully used on bulrushes and tules rooted in the water by spraying the above-water portions. It is important not to use excessive doses because the plants are apt not to absorb the poison into the root system. Although Nox-weed contains some boron and ammonium sulfamate and has an end product of ammonium sulfate, which is a fertilizer for algae, there appears to be no detrimental effect with either product in so far as water supply is concerned. It would be desirable after the war to ask the manufacturers to prepare a sodium sulfa-

COMMITTEE ON WATER SUPPLY

Organized 1922. Published reports: *A.J.P.H.*, Sept., 1924, Apr., 1925, Feb., 1926, July, 1927, Apr., 1928, Feb., 1929, May, 1930, *Year Books* 1930–1931, 1931–1932, 1932–1933, 1934–1935, 1937–1938, 1939–1940, 1940–1941, 1941–1942.

mate substitute which would be better for surface reservoirs. Both compounds have been used extensively on at least one large water system.

The destruction of underwater weeds is being accomplished on a large scale by the use of Chloroben. Large irrigation districts are finding it economical to treat water weeds chemically by this method even though man power for old clearing methods might be available. The compound used in irrigation water produces odorous end products which, however, are not detrimental to human or plant life. In treating domestic water reservoirs a Chloroben of less odor and taste producing qualities is used, but even then considerable care must be taken not to treat too much water at any given time. One large system has used several thousand gallons at the rate of forty gallons per acre, partially controlling *Potamogeton natans* and obtaining as much as 50 per cent kill on the first application. After subsequent applications the growth should be completely destroyed.

Restricted experience in another state with "Benoclor No. 3," manufactured by the same firm, discloses that rooted aquatic vegetation is destroyed but that the material is soluble to the extent of about 30.0 p.p.m., which is well above the concentration of 0.03 p.p.m. found to impart an odor to water. Pending the collection of more comprehensive information it would appear that this treatment procedure should not be used when the treated water will be used at once for potable purposes but that the procedure has promise in the more effective control of rooted aquatic vegetation.

POST-WAR PROJECTS

Post-war projects have received wide publicity but it is pertinent for this committee to emphasize the need for enlarging and modernizing many water purification plants in view of enforced operation in excess of designed capacity during the war and because of recent marked improvements in the principles and practices of coagulation, filter washing, and chlorination. It is suspected that the magnitude of such a modernization program would far outstrip that of post-war projects for entirely new water supply projects but such improvements may lack glamour and may not receive public support unless stressed by appropriate authorities.

WATER TREATMENT

Recent developments in the design of water filtration plants definitely emphasize the trend toward the more extensive use of mechanical equipment, more elaborate coagulation and flocculation units and rates of filtration through sand filters in excess of the conventional 125 m.g.d. In some instances this trend is in conflict with existing codes of state departments of health and the *Manual of Recommended Water Sanitation Practice* of the U. S. Public Health Service. This is not the occasion to discuss the technical background which should underlie an administrative policy toward this trend but the situation is being mentioned at this time because it is very evident that state sanitary engineers and other officials entrusted with the approval of plans for proposed water filtration plants must carefully consider these developments and be in position to protect the public health without unduly restricting technical developments. In this connection reference is made to a committee study now in progress by the American Water Works Association to collect performance data at plants where short term sedimentation and high rate filtration are practised.

Reference also is made to research work at Fort Belvoir. Va., which has been reported upon by Black,[1] where diatomaceous earth has been used as a filter medium in place of sand. Additional unpublished data of the Army on this investigation indicate that a diatomaceous earth filter consisting of a fine-grained porous element or screen to which a "precoat" of diatomaceous earth is applied in amounts of about

0.15 lb. per sq. ft. of effective area frees coagulated and settled water to which diatomaceous earth is added as a "filter aid" of turbidity, bacteria, and the cysts of *Entamoeba histolytica* with filtration at rates of 6 to 10 gal. per min. per sq. ft. of filter area. The unit is pre-coated by circulating filtered water to which the diatomaceous earth has been added in appropriate quantities. While it would appear that considerable work still is needed to establish this new filtration process for public water supplies it is evident that an entirely new technique is being developed which may revolutionize water filtration.

The excellent performance of conventional rapid sand filtration plants has created confidence in the purification process involved without due regard being given to the paramount problem of providing effective operation. Accordingly many small filtration plants are constructed without thought as to the employment of trained operators or the availability of sufficient funds to insure effective operation. The trend toward more complex mechanical equipment therefore implies an obligation to provide capable operators. An increase in the salary scale of operators is of basic importance to the continued advance in water purification. This in turn implies the need to extend the program of licensing or certifying qualified operators to insure permanency of employment. There also is a need for extension courses for operators, which should be integrated into the official state programs of licensing operators.

The cost of operating treatment plants also focuses attention upon the need for further consideration being given to wells, springs and infiltration galleries as sources of public water supply. Greater attention should be given to the utilization of small slow sand filtration plants which can be operated with less skill than the average mechanical filtration plant. It would seem very pertinent for state departments of health to publicize the over-all problems involved in selecting sources of public water supply in order that budget provisions may be made for effective operation of proposed supplies rather than chief attention being directed to first cost.

Mention should be made of the proposed application of sodium fluoride to several water supplies to demonstrate whether this treatment procedure will lead to a reduction in the incidence of dental caries among the growing children in the communities served. Final plans are now being made for the treatment of the water supplies of Grand Rapids, Mich., and Newburgh, N. Y., and possibly a community in Canada. These demonstrations will continue for a period of ten years and will be accompanied by thorough dental and medical surveys of the children involved. This new development represents the first time a chemical has been added to public water supplies for purposes other than purification, except the application of sodium iodide to the water supply of several communities for a short period years ago, for the purpose of preventing goiter. So far very favorable public response has been received. There seem to be no engineering problems surrounding this treatment procedure.

The science of water chlorination has outstripped the application of known principles. For instance, boilers and pumps usually are installed in duplicate whereas too little thought is given to duplicate chlorination equipment. In fact, this is one of the paramount weaknesses in water treatment, although most everyone realizes that continuously effective treatment cannot be insured otherwise. Duplication should be extended to include auxiliary equipment of chlorinators so that in

case electric power fails and a standby engine-driven pump is operated the chlorinator also will function. One method of simplifying this problem is to have auxiliary engines also drive small generators to furnish current for a minimum amount of light and for the operation of small motor-driven pumps for chlorinator injectors or the small motors of hypochlorinators. The value of "standby" auxiliary power has been emphasized recently along the Atlantic seaboard by the recent hurricane.

Another fruitful field for improving public water supplies is the chlorination of surface supplies which now are delivered without treatment. About 568 surface supplies are now being operated without treatment, according to a study which represents statistics for about January 1, 1943. The following tabulation classifies chlorinated and unchlorinated water supplies in terms of population served.

Chlorinated Surface Water Supplies		*Unchlorinated Surface Water Supplies*	
Under 500	368	Under 500	267
500 to 1,000	460	500 to 1,000	149
1,000 to 5,000	1,264	1,000 to 5,000	137
Over 5,000	936	Over 5,000	15
Total	3,028	Total	568

As might be expected the greatest number of chlorinated surface supplies are those serving large populations and conversely the greatest number of unchlorinated surface supplies are those serving small populations. The treatment of small water supplies was both expensive and frequently difficult before the development of small size hypochlorinators. Satisfactory means are now available, however, for treating even the smallest supplies. There is a trend also to chlorinate well supplies for sanitary and esthetic reasons, there being many instances when such supplies should be chlorinated. The committee therefore stresses the need for correcting this fundamental defect in public water supplies.

Research with chlorine dioxide[2] for the control of tastes and odors has resulted in such favorable preliminary results that the subject is being reviewed at this time because the only published material deals with the effectiveness of the compound as a disinfectant. Chlorine dioxide is formed as needed by forcing a concentrated solution of sodium chlorite into the solution hose of a chlorinator conducting chlorine water to the supply being treated. The strong chlorine water has a pH less than 4.0 required for the formation of chlorine dioxide in accordance with the following formula:

$$2\,NaClO_2 + Cl_2 = 2\,ClO_2 + 2\,NaCl$$

Experience in the treatment of the water supply of Niagara Falls, N. Y., has demonstrated that tastes and odors incidental to algae growths, the woody tastes apparently incidental to decomposing organic matter, and the medicinal tastes incidental to industrial wastes can be destroyed by doses of chlorine dioxide between the limits of 0.25 p.p.m. and 0.6 p.p.m. under the conditions surrounding this supply. Obviously a number of supplies must be treated before the range in required doses and effectiveness can be determined more accurately. Either raw water or previously chlorinated water may be treated, although economy can be secured by the practice of post treatment. In practice sufficient chlorine is added to react with the sodium chlorite and to provide an excess for disinfecting purposes. While chlorine dioxide is a disinfectant in itself, its germicidal power as compared to chlorine needs to be studied more fully. On the other hand, chlorine dioxide increases the oxidation potential of the treated water and thus facilitates disinfection. As other supplies are to be

treated on an experimental basis, more extensive information should be available without undue delay.

IMPROVED CONTROL OF CHLORINATION

Recent technical literature has demonstrated conclusively that the effectiveness and rate of disinfection with chlorine or chlorine products is closely associated with the oxidation potential, and that superchlorination reactions produce a high oxidation potential as indicated by the presence of free or more "active" residual chlorine as contrasted to chloramines. It is also quite well established that the "flash" test is a useful qualitative test for more active residual chlorine although subject to error through the influence of manganese. This important development, however, has been restricted largely to supplies where superchlorination is practised for improved taste and odor control. There is a tendency, however, to adopt superchlorination for improved disinfection, and in fact the whole subject of chlorination is undergoing an important refinement which warrants close study so that improved techniques may be used more widely.

The "flash" test is only qualitative in that the resulting color is changing so rapidly as to prevent accurate comparison with the standards. The orthotolodine-arsenite (OTA) test,[3] however, provides a quantitative determination which distinguishes between more active chlorine and chloramines and in addition provides a quantitative measurement of any errors incidental to interference by manganese, nitrites or iron with the o.t. reaction. The important point therefore is that the OTA test provides an accurate quantitative test for the control of superchlorination and also enables conventional chlorination to be appraised. Such an appraisal has disclosed that many raw waters contain sufficient free ammonia to form chloramines without any thought having been given to the fact that chloramine reactions prevail rather than those due to free chlorine. In other instances serious errors due to the presence of manganese have been disclosed.

It is very evident, therefore, that these technical developments should be utilized more generally to improve the control of chlorination as well as indicate conditions which justify the abandonment of chlorination or the adoption of superchlorination to insure rapid and effective disinfection.

"LABORATORY CONTROL"

The inability to purchase laboratory supplies during the war draws attention to the need for post-war expansion of laboratory control of public water supplies. This expansion, however, should be integrated carefully with the actual operational needs of water supply officials because there seems to be a tendency to over-emphasize the mere number of samples examined without due regard being given to the coördination of sampling points and the frequency of sampling in terms of operation and supervision and without the laboratory technique being adapted to disclose information actually needed by the operators. It is believed that this tendency should be counteracted by an educational program by state departments of health to emphasize the true function of control laboratories so that undue weight will not be given to the bacteriological examination of samples of water merely to disclose its sanitary quality. In other words the important point is that integrated effective control will insure a safe supply, whereas uncoördinated bacteriological examinations of samples will disclose only that a supply was safe or unsafe at the time the samples were collected, which information is available only after the conditions prevailing at that time have changed.

NEW BACTERIOLOGICAL MEDIA FOR WATER EXAMINATION

Everyone is aware of the inherent weaknesses of the standard test for coliform organisms, especially the work and time consumed in utilizing two separate media in the routine test. It seems very significant, therefore, that current experience with lauryl sulfate tryptose broth [4, 5] and buffered tryptose lactose bile salt, Eijkman or EC medium,[6] are quite favorable, although experience with the former had not been so favorable in the Southwest. The indications are that either of these media may provide a specific and simplified test for coliform organisms within 24 hours, or at most 48 hours, without the need for confirming positive results. Every effort should be made to facilitate this important development.

SUPERVISION OF DISTRIBUTION SYSTEMS

The prevention of secondary pollution of potable water supplies through cross-connections with potable supplies and the attention being directed to the bacterial content of water flowing through distribution systems because of the 1942 revision of the U. S. Public Health Service Drinking Standards, coupled with the demand of Army officials that water supplies serving Army posts, etc., contain 0.4 p.p.m. residual chlorine, has drawn attention to the overlapping problems pertaining to the operation of distribution systems so as to insure the delivery of attractive water of safe sanitary quality to the public. The difficulty of course is that the solution of any one aspect of this problem frequently complicates other aspects so that it is necessary for the whole field to be restudied for the development of fundamental principles which will provide the necessary administrative and technical procedures. It is significant, therefore, that a committee is now being organized for this study by the American Water Works Association.

Preliminary work has disclosed that distribution systems support a larger variety of organisms than might be anticipated from data disclosed by the agar count or tests for coliform organisms. While this is to be anticipated it is significant that the studies so far have not solved any problems but have merely disclosed the complexity of the subject. For instance, it is not clear whether members of the coliform group will actually develop on "pipe slime," whether such organisms originally present in the raw water may be temporarily rendered inactive to be followed by periods of growth in distribution systems when residual chlorine disappears, or whether organisms embedded in sediment may collect in pipes and be thrown into suspension during periods of high flow, etc. Obviously until more light is thrown upon these uncertainties the interpretation of the sanitary significance of coliform organisms present in samples from distribution systems will be quite difficult.

Another illustration of this complex problem is that biochemical activity in distribution systems may be responsible for objectionable tastes, such as through the reduction of sulfates to sulfides, while other growths might be responsible for obscure aspects of pipe corrosion which cannot be explained by the electrolytic theory.

WATER-BORNE TROPICAL DISEASES

The interest in tropical diseases incidental to the war has led to considerable publicity being given to the subject in current literature, some of which might be misinterpreted as signifying a serious menace to the health of the citizens of this country. Epidemiologists have been cautious when discussing this subject, as illustrated by the following quotation [7] from Gaylord W. Anderson, Lt. Col., MC, AUS.

Today the situation is far different. We have a greater proportion of our population outside of our territorial limits than ever before in history. Even more significant, we have them scattered in all corners of the globe and many of them in the most disease infested corners of the globe, in areas where diseases known to us only by name are a local commonplace, in areas where conditions that would be museum curiosities in this country affect the majority of the native populations. . . . It is logical, therefore, to ask us to the extent to which our soldiers returning victorious at the end of this war, may unfortunately return infected and because of their infection, introduce disease into the United States.

This is by no means a new idea. Already much has been written and published regarding the risk of introducing new diseases to this country or bringing back increased quantities of diseases that we now have. Much of this literature is of an alarming nature, portraying at times in high sensational form, a dire calamity that, like the sword of Damocles, hangs over our heads, ready to precipitate disaster unless drastic control measures are adopted. Conversely, others, more conservative, and I believe with more careful appraisal of historical epidemiology, fail to find cause for alarm and seriously question whether or not these diseases can be introduced in such quantity as to constitute a menace or whether, once introduced, these infections can establish a foothold in this country. I confess at the onset that I belong to this latter group. . . .

It is significant that many of the tropical diseases are insect-borne and while important are not of direct concern to this committee. It is pertinent, however, to review briefly certain administrative aspects of water-borne tropical diseases.

Typhoid fever, cholera, bacillary dysentery, and amebic dysentery appear to be of significance in this connection. Typhoid fever is under control in the Army and very well established procedures are generally followed in this country for the prevention of spread of this disease when of domestic origin so that imported typhoid fever does not appear to represent a menace. There is little exposure to cholera except for the troops in India and China and apparently no cases have occurred so far in our Army. Furthermore carriers of this disease do not exist, so it would seem that cholera can be considered as of no administrative significance.

While bacillary dysentery is endemic in this country it would appear that the Shiga type of this disease does not occur. However, there is the possibility of this more serious type of bacillary dysentery being imported from the South Pacific. One gains the impression, however, that this potential menace can be satisfactorily handled by utilization of present procedures, but naturally there may be areas where conditions are such as to require special vigilance.

The situation in regard to amebic dysentery is more favorable in that this disease is not widespread in this country even though there is definite evidence that 5 per cent to 10 per cent of the total population harbor *E. histolytica*. Amebic dysentery contracted in Burma, India, and the Philippines is said to be more serious to Americans entering these countries than when contracted in the United States. This may be due to mass infection under conditions prevailing in the tropics, or to greater virulence of the organism involved. It would appear, however, that the importation of additional carriers of this disease will not materially influence the favorable situation now prevailing because it appears that fresh and rather gross pollution of potable water with sewage from populations including active carriers is required before outbreaks occur, such as the well known Chicago outbreak. Again to quote Anderson:

Undoubtedly some of our soldiers will acquire amebic dysentery infection in foreign lands and may return to this country harboring the amebae. Yet when we consider that about 2–10 per cent of the population of the United States probably harbors the cysts of the *Entameba histolytica* I cannot become

alarmed about the addition of a few hundred thousand individuals to a reservoir that now probably numbers around ten million. The probable reasons why amebic dysentery is so rare in this country in spite of the large reservoir of infection need not concern us here. The risk of introducing bacillary dysentery seems also slight in view of the rarity of really chronic carriers.

It is fortunate that this is the case because it has been demonstrated that the cysts of *E. histolytica* are resistant to doses of chlorine which are applied normally to potable water supplies except when superchlorination is practised, although effective filtration at the rate of 2 g.p.m. per sq. ft. has been found to remove the organisms from water. This also applies to diatomaceous earth filters even with higher rates of filtration.

Schistosomiasis is a disease known to be endemic in tropical and sub-tropical countries. Infection results from contact with water containing the cercariae of the schistosome either through bathing or from drinking water containing the cercariae. A limited number of cases has been reported among the Armed Forces. Certain species of snails serve as host of the parasite. The National Institute of Health, U. S. Public Health Service, is studying schistosomiasis and all species of domestic snails which might serve as intermediate host of the parasite. It is significant that the cercariae will penetrate sand filters. Studies conducted by the National Institute of Health, U. S. Public Health Service, have demonstrated that cercariae are completely removed by diatomite filtration. The sanitary significance of schistosomiasis in the United States imported by infected troops returning from foreign theaters cannot be accurately predicted at this time.

It would appear evident that valuable and somewhat unique developments in the field of public water supply are likely to result from the research work during the war and that certain problems have been emphasized by the war effort. The committee therefore stresses the need for a stocktaking at this time in order that fruitful use might be made of new knowledge during the transition period to peacetime conditions.

REFERENCES

1. Black, Hayse H. Army Field Water Supply Developments. *A.J.P.H.*, 34, 7:127 (July), 1944.
2. McCarthy, J. A. Bromine and Chlorine Dioxide as Water Disinfectants. *J. New England W. W. Assn.*, 58, 1:55 (Mar.), 1944.
3. Hallinan, Francis J. Test for Active Residual Chlorine and Chloramine in Water. *J. Am. Water Works A.*, 36, 3:296 (Mar.). 1944.
4. Cowls, P. B. A Modified Lactose Broth for Use in the Presumptive Test. *J. Am. Water Works A.*, 30:979, 1938.
5. Mallmann, W. L., and Darby, C. W. Uses of Lauryl Sulfate Tryptose Broth for the Detection of Coliform Organisms. *A.J.P.H.*, 31, 2:127 (Feb.), 1941.
6. Perry, C. A., and Hajna, A. A. Further Evaluation of EC Medium for the Isolation of Coliform Bacteria and *Escherichia Coli*. *A.J.P.H.*, 34, 7:735 (July), 1944.
7. Anderson, Lt. Col. G. W. The Threat of the Spread of Tropical Diseases to the United States. Unpublished paper read before American Society of Civil Engineers, Jan., 1944.

CHARLES R. COX, *Chairman*, State Department of Health, Albany, N. Y.
HAYSE H. BLACK
H. J. DARCEY
ARTHUR E. GORMAN
RAYMOND F. GOUDEY
L. L. HEDGEPETH
HAROLD STEPHENS HUTTON, C.E.
ARTHUR D. WESTON

Post-War Sanitary Engineering Problems*

Engineering Section

A NUMBER of agencies and associations are studying and reporting on post-war sanitary engineering plans and programs. This committee has endeavored not to duplicate any of these known efforts and to present here some of the more important sanitary engineering problems of special concern to public health administrators. These problems include the return of engineers from military life; deficiencies in sanitary facilities due to the necessary postponement of alterations, extensions, and new construction for the war period; housing; public health education for engineering leadership; and administrative relationships of professional engineering personnel for their most effective utilization.

APPRAISAL OF NEED FOR SANITARY ENGINEERING PERSONNEL

In endeavoring to make an appraisal of the need for sanitary engineers and sanitarians in local, state, and private health agencies after the war, some consideration should be given to the influences which have increased the demand for more sanitation services throughout the country.

State and local health departments are now greatly depleted, in fact, down to skeleton form. The 800 sanitary engineers expected to return from military life in the next two years could probably be absorbed by the 48 state health departments alone. Local and state health departments before the war employed approximately 5,000 sanitary engineers and sanitarians. With the expansion foreseen by the American Public Health Association committee working on full-time health services for the entire country, some 12,000 sanitary engineers and sanitarians will be needed.

Malaria control, typhus fever control, and food and restaurant sanitation programs have been enlarged and will continue at the increased size for some time. Industrial sanitation will call for additional sanitary engineers to maintain even a minimum program in the states, in the opinion of those directing the work. Should a public works program be inaugurated by the federal government after the war, probably rural sanitation, stream sanitation, water supply improvements, and sewage disposal works would be included. These call for planning and direction by sanitary engineers. It seems reasonably certain that the fields of sanitary engineering and sanitation are likely to increase and expand both in areas served and in functions performed.

Certain war emergency classifications have been set up in the merit system schedules for sanitarians and other public health personnel recruited, and short in-service training courses have been given during the war. It should be provided that such workers be given an opportunity to qualify for subordinate positions in the health departments as the experienced, trained workers return to their positions from military service.

The available man power to fill responsible positions in sanitary engineering and sanitation for the next few years must of necessity come from the returning veterans, and the war workers released by industries which

* First Report of the Committee October 3, 1944.

undergo conversion to products for civilian use. Some plan should be devised by the U. S. Public Health Service and the states working together, to reach these young men and women in the demobilization centers, with information concerning training courses, opportunities for security and the rewards of a career in public health engineering or allied sanitation activities.

The Procurement and Assignment Service, War Manpower Commission, has established a roster of sanitary engineers for the purpose of assisting the Army and the U. S. Public Health Service in obtaining commissioned officers to serve in the sanitary engineering fields, and at the same time to maintain essential sanitary engineering services for protection of the health of civilians.

At present the records in the Procurement and Assignment Service indicate that there are 984 sanitary engineers in the Army, 127 in the Navy, and 530 in the U. S. Public Health Service. Some of these commissioned officers will continue their careers after the war in the several federal services which have been expanded and will remain somewhat enlarged due to the war's influence. It is estimated that of this total of 1,641 sanitary engineers, approximately 50 per cent, or 800, may return to civilian public health activities in the next two years.

It is conceivable that the roster of sanitary engineers set up to serve military and civilian public health protection in wartime might be converted into an agency which would serve sanitary engineers returning to civilian life.

SANITATION FACILITY NEEDS

There have been major adjustments best to serve the total war effort, not only in sanitary engineering services but in the fields of water, sewerage, housing, and other sanitary works where there has been an almost total postponement of alterations, extension, and new construction, except in critical areas to serve the war needs.

Deficiencies in water supply, sewage, and other sanitation facilities in urban and rural areas are being evaluated by those agencies interested in the public health importance of meeting these needs—and by those concerned with the significance that the construction activities might have in stabilizing post-war employment conditions. In this activity, state sanitary engineers, coöperating through the Conference Committee on Post-War Planning, have prepared a report which when released will give the scope of work needed to meet recognized deficiencies in public water supply and sewerage. Concurrently, the U. S. Public Health Service has undertaken and published reports on similar evaluations of sanitation facility needs including both rural and urban areas. These data indicate the importance of centering public attention on this field of post-war construction activity. The priorities of war have greatly increased the amount of deferred maintenance of these essential utility services. The need for the extension and betterment of existing facilities is easily established and should have early consideration in the post-war period. The Public Health Service has estimated that there now exists a need for the construction of improvements to existing public water supplies costing in excess of one-half billion dollars ($502,340,000). The deterioration of the sources of public water supply, due to a failure to maintain and extend adequate treatment facilities for both domestic and industrial sewage wastes, gives an emergency aspect to the need for an early start on a sewage treatment plant construction program on a comprehensive basis. The Public Health Service has estimated that there now is a need for over one billion dollars ($1,055,150,000)

worth of construction in this field alone. Since not all sewage and waste treatment projects are of equal public health interest, a program of the magnitude indicated should recognize the importance of giving early construction priority to the more urgent situations.

Surveys of unmet needs in the sanitary as well as other fields of construction activity are of practical value in that they call attention to the economic folly of any repetition of made work programs for unemployment relief. If construction programs can be prepared with proper emphasis on developing coöperative responsibility on the part of local governmental units, permanent progress may be assured. It is important that governmental procedure used in the promotion of the national interest in unemployment relief recognize the need for the coöperation of those agencies of government having knowledge of the economic loss from not providing needed improvements. The cost of new sanitation facilities, estimated by the Public Health Service to total approximately three and a one-half billion dollars, should not be regarded as a drain on our national resources. Rather it is a means of stopping the economic loss due to a failure to provide these services and the protection consequent upon their construction.

PROGRESS IN PLANNING SANITARY WORKS

The Committee on Water and Sewage Works Development, created by the American Water Works Association, the New England Water Works Association, The Federation of Sewage Works Associations and the Water and Sewage Works Manufacturers Association has been active in calling to the attention of public administrators the importance of water and sewage work in post-war planning—epitomized in the slogan "BLUEPRINT Now—for Tomorrow's Needs." Latest (Sept. 8, 1944) available statistical data as released by the A.S.C.E. Committee on Post-War Construction indicate that the potential construction program in water works is $454,000,000, with plans under way or complete totaling $258,000,000. On the sewerage sector the potential construction program is $756,000,000 with $456,000,000 "on the drafting boards." During "normal" times water works expenditures average $80,000,000 yearly and those for sewerage, $91,000,000. During the peak PWA period these figures were $163,000,000 and $160,000,000, respectively.

Despite these figures, which are so impressive, it should be pointed out that the needs after these war years of deferred construction will be greater. However, the progress on advance planning of work to be constructed after the war, as compared to needs, indicates a reluctance on the part of public officials to provide the funds necessary for the preparation of detailed plans and specifications. This is true despite a general public recognition of the need for such planning. If planned public works are to assist in providing an emergency channel for any flood of post-war unemployment, it is essential that the work be carried to the blue print stage well in advance of this need.

HOUSING NEEDS

Urban health departments have long taken an official (although frequently vicarious) interest in housing problems, first through study of the incidence of disease among slum dwellers, later through the enforcement of regulations pertaining to sanitary conditions in residential areas, and more recently through the appraisal of housing conditions. Despite this long history of activity and some slight improvement in interest, little has been done by health

departments to disturb the basic pattern of the "blighted areas" and slums.

The organization of a housing program by a local health agency involves several distinct but interdependent steps. The primary problem is one of study to determine housing needs, underlying causes of slums, factors which determine the shifting and spread of blighted areas and the place of the department of health in the total effort of any community to improve housing conditions. At the same time each community, lead by the department of health, must define a minimum standard for occupied dwellings. The standard is needed as attempts are made to evaluate housing conditions; in setting up enforcement regulations, and in determining costs to support or finance houses which are repaired to meet the standard.

Desirable and practical standards for new housing and for new communities have been and are being developed in those communities where public housing authorities exist. Private housing construction is controlled in most urban communities through building codes, planning commissions, and zoning ordinances. Much remains to be done to bring these two standards for new housing closer together. One is positive in its use—the other is largely negative in its control and may not be up-to-date.

Health departments, in order to exert a constructive influence on these house building programs, must be in possession of facts and familiar with the problem. Efforts in the enforcement field without an understanding of the overall problem as it exists in each urban area are wasteful and unsound. Houses and homes cannot be treated in enforcement programs as restaurants, dairies, or nuisance complaints. People must live somewhere and they must pay their way, except as relieved in part in public housing or as welfare clients. Health officers should be wary of schemes, based on the payment by welfare agencies of rent allowances for low income groups, as this infers that the community will increase the funds available to the welfare department to make it possible for the owners and attractive to builders to maintain or to build low cost housing for welfare clients. Unless such new funds are made available, and this seems extremely unlikely, the suggested scheme will obviously perpetuate slums and blighted areas.

The desirable housing activities of a local health department engineer should include:

1. Study of housing needs for the community.
2. Definition of minimum standards for existing housing and securing community agreement thereon
3. Determination of cost of meeting the minimum standard for existing housing
4. Preparation of a housing code
5. Examination of standards in use to control new houses and communities in comparison with public housing standards
6. Preparation of a sound program for the department of health in relation to an overall housing program of the city
7. Development of a comprehensive inspection program properly integrated with the total effort of the area

The public health engineer in each urban area should take an active and leading part in initiating studies and in coördinating housing effort. This is one of the most challenging problems before the public health engineer today. It is late, but a start should be made as there is no short cut to a sound housing program.

ENGINEERING AND PUBLIC HEALTH EDUCATION

The engineering division in local, state, or federal health departments should coöperate rather closely with the health education division, as the latter group can be most helpful in making efforts in the engineering field effective and successful.

The health education division can aid in producing good and effective literature prepared in an attractive form for specialized propaganda as to needs and measures known to be effective. Health education if improperly used can damage a program and hinder progress by selling unsound ideas and procedures to the people. Furthermore, the health education division should be especially valuable in working out educational methods in the sanitation field to aid the field engineers, sanitarians, and inspectors to become truly effective health educators. An educational program is an essential part of the activity of each service division and consultation in educational methods should be available in the department.

EDUCATION FOR LEADERSHIP

The preparation of an individual for a health department career in sanitary engineering presents many problems in selection, education, and training. Intangible qualities such as leadership, ability to get along with people, vision, and social awareness are essential attributes without which an otherwise competent and well trained person may be unable to achieve success in the administration of a sanitation program. Any engineer who has served successfully as an administrator in a local health unit can testify to this fact.

It is evident that, if the scope of engineering activities in health departments is to grow properly, leadership will have to be developed. Although it is easy to train technicians, the education of leaders is difficult. The Association Committee on Professional Education has outlined the educational qualifications for engineering and sanitation personnel, to be employed in health department.

PERSONNEL ASPECTS

Public health work is essentially personal service. The availability and quality of specialized personnel are, therefore, primary requisites in the performance of public health functions. Engineers are as necessary for sanitary engineering services as are physicians for medical duties. Competent technical assistants (sanitarians) for the engineer are as vital in the field of sanitation as are well trained nurses to the medical director. The slowness of administrators and the inertia of governmental agencies in recognizing these facts are painfully apparent, but postwar progress in the wider control and improvement of environment for the betterment of the public health and comfort demands positive adjustments of the public health policy and organization to this end.

Engineering is a profession parallel to that of medicine. In the historical development of public health work, it is recognized and accepted that physicians should occupy the executive positions having general administrative responsibility. However, professional functions are not interchangeable and the achievement of maximum results in public health organization requires engineers in administrative positions with the authority to unify and direct all engineering and sanitary work. The engineer, representing one of the two major professions engaged in public health work, is properly second in rank and responsibility to the executive head of the organization for all engineering services. This is being repeatedly demonstrated in practice where rational organization has permitted capable engineers to function.

Similarly, the compensation and the organizational rank of engineers should be on the same level as that of physicians heading other special services. There can be no longer any justification for the invidious distinctions which have been and are being maintained against engineers in the matter of their employment, pay, and rank. Proper

recognition of engineers and of technical personnel can be withheld only at the expense of a balanced public health program.

There is no local health jurisdiction that does not require engineering service. Admittedly, many local health areas are now too small to employ an engineer efficiently. Consequently, the need must be met through the provision of engineering personnel from a level above the small local units, so that both professional service and technical supervision may be locally available as required. The sanitary engineering functions within a state should be carefully integrated from the state division down through districts, to counties and municipalities with direct lines of technical contact.

In those political jurisdictions where the legal responsibility for the public health protection of the environment has been delegated in full or in part to the local health department, it is recognized that the health officer cannot fully discharge his legal responsibility for the public health protection for those phases of the environment for which he is responsible without qualified engineering service under his direction. This is generally the case in municipal health departments but not always so in county health departments. In all political subdivisions of the state, for those activities in which responsibility has not been delegated, there must be no interposing of intermediary medical personnel in the professional relationships of state and local engineers, outside of purely administrative organization.

State divisions of local health administration, whose chief functions are to promote and coördinate local public health medical functions and administration, have in some cases, presumed to act as the medium of contact between state and local sanitation personnel, with disruptive effects. The lines of communication and contact between state and local engineers in such areas must be kept clear and direct.

Areas adapted to the performance of local medical health work do not necessarily coincide with areas most suited to sanitary functions. In the establishment of local health centers, decentralization of medical services is the chief objective, but there are decided disadvantages in breaking sanitation work into similar small units unless definite responsibilities for the public health engineering protection services of his community have been legally delegated to the health officer of such a district. In such cases, the health officer must have a qualified sanitary engineer under his direct supervision in order to discharge these responsibilities properly. Sanitary engineering personnel should not be placed under the supervision of a health officer of a subdivision of some local political unit unless legal responsibility for public health protection of the environment of the area under his jurisdiction has also been assigned to him.

Two basic principles of administration should govern in all relationships of health officers to sanitary engineering services; the first being that all sanitation services should be directed by a qualified sanitary engineer, and second that the director of such engineering services should be responsible to the health officer having legal responsibility for the sanitation of the environment of the community under his jurisdiction.

All phases of environmental sanitation require close engineering direction and coördination. Administration and office quarters for sanitation personnel should ordinarily be centralized and, unless governed by political boundaries, the area served should be limited only by the practical economies of travel and transportation of field employees or in consideration of public relationships.

Urban health departments are either isolated or integrated with respect to other agencies of the community depending upon their ability to approach common problems from the appropriate technical viewpoints. With engineering personnel, health departments are able to develop mutually beneficial relations with such agencies as planning and zoning boards, housing authorities, building and public works departments, water and sewer departments, and plumbing boards, as well as a number of private organizations whose primary interests are in commmunity environment in its various aspects. The influence exerted by a health department depends upon its ability to speak the language of the numerous other agencies and interests of a community, among which a county medical society is by no means exclusively important.

Civil service or local political restrictions requiring local residence as a condition of employment hamper professional employment and force the tax paying public into the employment of mediocre or poorly qualified personnel. The general custom for governmental units to make residence primary and education and experience secondary in its employment requirements is not only poor business but promotes provincialism and retards progress. The ultimate effect will be to exclude the younger generation of any particular county, city, or state from the great field of employment throughout the United States and to limit aspiring and trained young people to the few public service positions occasionally available locally. The young engineer or physician who has carefully prepared himself for a professional career finds himself barred from many jobs reserved for the poorly qualified home town boy. Similarly, a whole generation, now in school, may find itself excluded from government civil service by the arbitrary preferences being granted to veterans, disabled or otherwise, regardless of how slight their qualifications may be for such technical positions.

Fortunately, the existing need for trained sanitary engineers in health departments throughout the United States coincides with an unusual supply of such personnel shortly to become available upon the demobilization of our victorious military forces. It will be the duty and opportunity of local governments and of health administrators throughout the nation to make use of these men in the achievement of the greater public health objectives which lie ahead.

SUMMARY

An estimate of post-war needs for sanitary engineers in health departments and a method of facilitating the return of sanitary engineers from military to civilian life is suggested. The deficiencies in sanitation facilities are being evaluated by those concerned with the significance that post-war construction activities might have in stabilizing employment conditions in the post-war period. The estimated cost of improvements to existing public water supplies is in excess of one-half billion dollars. The total overall cost of new sanitation facilities, is estimated by the Public Health Service as approximately three and one-half billion dollars.

The Committee on Post-War Construction of the American Society of Civil Engineers on September 8, 1944, released the following figures on the potential construction program: in water works $454,000,000 and in the sewerage field $756,000,000.

The problem of housing and some suggestions for meeting the issues are outlined.

It is pointed out that an educational program is an essential part of the activity of an engineering service in every health department. The engi-

neering phases of the educational program must be well integrated with the engineering service program.

The need for a professional acceptance of engineering leadership in the field of sanitation in order to secure maximum progress in reaching public health engineering objectives is stressed.

A. H. FLETCHER, *Chairman*,
125 Worth St., New York
EARNEST BOYCE
J. L. BARRON
E. L. FILBY
JAMES M. JARRETT
M. A. POND
E. S. TISDALE

More Public Health Nurses Will Be Needed

Local Health Units for the Nation, soon to be published by the Commonwealth Fund, indicates that if basic minimum full-time local public health services were organized to serve every person in the United States, more than 26,000 public health nurses would be required. This estimate is based on a standard of one public health nurse per 5,000 population for a public health nursing program including school nursing but not bedside care of the sick. The study, the report of the association's Committee on Local Health Units under the chairmanship of Dr. Haven Emerson, found that in 1942 fewer than 15,000 public health nurses, including school nurses, were employed by official local health agencies. In other words, nearly twice as many nurses are needed for a minimum program as are currently employed even while some cities or counties have already gone beyond a minimum program.

The 1944 figures of the National Organization for Public Health Nursing indicate that there are only about 21,000 public health nurses in the country employed by all types of agencies, official and voluntary. Fewer than 30 per cent of these, or only about 6,000, had had a year of postgraduate work in public health nursing as specified in the suggested professional qualifications for public health nurses.* In other words, fewer than one-fourth of the number that will be required have the professional training recommended by the Association's Committee on Professional Education. Here is one area of unfilled needs for returning nurse veterans of the present war.

The study of the Committee on Local Health Units also indicates a great shortage of clerical staff in local public health services. Such a shortage frequently results in making the nurse shortage even more acute since nurses must perform many clerical duties that could be more economically performed by less highly paid workers. The committee estimates that it will take nearly 9,000 clerks to staff a minimum service, whereas in 1942 fewer than 5,200 were employed. The minimum standard set by the committee is for one clerk per three nurses, or one per 15,000 population.

In setting up a tentative plan for minimum basic local health services, the committee suggests that fewer than 1,200 units will be needed to serve the 3,070 counties of the United States and their contained cities, whereas at the present time some 18,000 jurisdictions essay to perform this service in town, township, village, city, county, city-county, or multi-county units, ranging in population from eight persons to seven and a half million.

* Recommended Qualifications for Public Health Nursing Personnel, 1940–1945. Committee on Professional Education, A.P.H.A. and Education Committee, N.O.P.H.N. *A.J.P.H.*, 32, 7:748 (July), 1942.

BOOKS AND REPORTS

All reviews are prepared on invitation. Unsolicited reviews cannot be accepted. All books reviewed in these columns may be purchased through the Book Service.

Bacteriology and Allied Subjects—*By Louis Gershenfeld. Easton, Pa.: Mack Publishing Co.,* 1945. 561 pp. Price, $6.00.

This volume is derived from works previously published under the title "Bacteriology and Sanitary Science" by the same author, but the name has been changed to "Bacteriology and Allied Subjects" as being "all-inclusive." The reader is expected to have a working knowledge of the subjects discussed. No attempt has been made to correlate available information and to bring it together with the fundamentals of bacteriology into one text. The volume is the result of the author's own need for a teaching and reference text. The selection of material is broad and is intended primarily for students of pharmacy.

The Table of Contents includes, in addition to standard bacteriological topics like history and scope of the subject, characteristics, methods of study, cultivation and classification of bacteria, etc., such headings as Flatworms, Roundworms, Arthropods, Rodents, Snakes and Higher Animals, Insect Extermination and Insecticides, and Fumigation. The section on biological products is rather detailed and reflects the author's interest and long study in that field (45 pages). The discussion of disinfection and sterilization is also unusually detailed and complete, covering 60 pages. Other topics are much less extensively dealt with, for example, Antibiosis, Bacteriotherapy, Penicillin, Gramicidin and Phagotherapy (7 pages total). Diseases of unknown, doubtful or indefinitely determined etiology (including scarlet fever and yellow fever, rabies, smallpox, dengue, rheumatism, and 30 other diseases), 23 pages in all. Thus, the selection and balance of consideration of material is not entirely conventional, as pointed out by the author who "included certain information not found in most textbooks of bacteriology but which is of value for those for whom this volume is intended."

The arrangement is probably convenient for the author's purposes but seems to lack unity for the ordinary reader. In general, the treatment is brief but encyclopedic. References to original papers and other literature are given in the text. There are only about a dozen illustrations, and charts and diagrams are rare or absent. The table of contents is very extensive and there is a well constructed index.

MARTIN FROBISHER

Mass Miniature Radiography of Civilians—*By Clark, Hart, Kerley, and Thompson. London: His Majesty's Stationery Office,* 1945. 135 pp. Price, $.90.

This volume consists of a detailed report of a mass radiographic 35 mm. survey conducted for research purposes on four selected civilian population groups of approximately 23,000 persons in Greater London, including two factories, an office group, and a mental hospital.

Technical and administrative problems arising in connection with civilian mass radiography are discussed in minute detail in Part I. The development and acceptance of the Morgan

phototimer has modified the whole procedure of mass miniature radiography to such an extent that much of the material covered, including the necessity of a large operating team, can be eliminated in future survey work. The employment of a permanent team of eight members for examining 1,500 persons per week appears excessive by American standards.

Part II contains the statistical results of the 1943 survey by one experimental unit, with an excellent discussion of associated epidemiologic and control problems. Reliable estimates are given of the incidence of pulmonary tuberculosis during wartime in various civilian groups, with estimates of the demands likely to be made on tuberculosis services by mass radiography.

A worth while suggestion is made for a simple administrative classification in mass radiography in order to facilitate comparison of results internationally. Caution must be exercised, however, in the separation of "observation" and "treatment" cases, and should not be based on a single chest x-ray film examination alone.

The results of laryngeal swab cultures as a simple bacteriological procedure following mass radiography warrant more extensive investigation and use of this technique in this country. A supplementary report on the reinvestigation of one of the factory groups at the end of a year is briefly presented, illustrating the general experience that subsequent routine surveys produce fewer cases than initial surveys.

The survey was purposely limited in size and scope so that much experimentation could be done. With greater experience, further simplification of technique and administrative procedure will undoubtedly follow. The exhaustive analysis of accurately collated data is clearly presented and well worth reading. HERMAN E. HILLEBOE

The March of Medicine, Lectures to the Laity, 1944—*New York Academy of Medicine. New York: Columbia University Press,* 1945. 121 pp. Price, $1.75.

The book entitled "The March of Medicine"—a publication of the annual series of lectures to the laity of the New York Academy of Medicine is of considerable interest to those in the public health field as well as to intelligent laymen who wish to be informed about the newer developments in medicine.

The lecturers come from widely diversified fields and, while the subjects are equally diversified, they form a pattern of developments that have affected the lives of many during the last few years.

The series begins with a contribution of Edward A. Strecker in a discussion of morale and propaganda. He recalls to the reader the oft-forgotten fact that it is impossible to understand a nation by its material measurements—its machines and gadgets and wealth. The spirit of man is that which counts, he says, and the mental health of the nation is dependent upon the spirit.

Charles Glen King reviews the advances made by science in the cause of better nutrition and presents the yardsticks so far developed for measuring adequate nutrition. This contribution is of great importance in the face of changing diets brought about by food shortages caused by the war.

Chemotherapy, even if vaguely understood, has become everyday conversation in remote parts of the country. Colin M. McLeod describes the body processes through which chemotherapy becomes valuable in attacking certain diseases, and illustrates the careful scientific research employed before certain of the so-called "wonder drugs" are released for use.

Medicine and a Changing World was presented by Reginald Fitz who says

that medicine is not a monopoly and that "if the public has ideas connected with medicine, doctors must be receptive to such ideas as are reasonable," if the national health is to be improved.

Sir Gerald Campbell in an engaging manner relates the effect of science on the lives of human beings and cautions that the machine is the instrument of man and will serve him only as his intelligence is employed in its use.

From the Medical Corps of the United States Army, Thomas T. Mackie contributes a discussion of the control of epidemics during wars and he concludes that, while these wars bring loss of life and untold miseries, from them have come advances in the science of medicine.

This book, small in size, is one of the contributions of American medicine to health education.

MARY P. CONNOLLY

Introduction to Parasitology, With Special Reference to the Parasites of Man—*By Asa C. Chandler, Ph.D. (7th ed.) New York: Wiley,* 1944. 716 pp. Price, $5.00.

The 7th edition of this book is as stimulating, accurate, and interestingly written as the first edition which the reviewer used some 20 years ago in his first course in parasites and human disease. The book has grown considerably in its various editions and includes not only the usual metazoan parasites of man but considers rickettsial diseases, the filterable viruses, and diseases due to spirochetes. There is also an extensive section on arthropods and disease. Although the life cycle, anatomy, treatment and prevention of the various parasitic forms are given in detail, the broader problems of parasitic existence and general human implications of parasitic diseases are developed with the understanding that is the result of Dr. Chandler's broad biological experience. Much of the material in the book is the result of his firsthand observations in the field and laboratory.

This book is written primarily for college students. It is, however, so complete and up-to-date that the medical and public health professions will find it of great value. The book is written in a stimulating, readable style and the author frequently takes one behind the scenes, as for example in the microfilaria periodicity controversy, "For blow by blow accounts of this contest, see Hinman, 1937, and Lane, 1937."

HAROLD W. BROWN

Approved Laboratory Technic—*By John A. Kolmer and Fred Boerner. (4th ed.) Philadelphia: Appleton-Century,* 1945. 1017 pp. Price, $10.00.

The new fourth edition of this valuable book "has been heavily revised, largely rewritten, and considerably enlarged by the inclusion of newer methods and new illustrations." It presents in concise form, usually in numbered steps, the technic of a very great number of methods used in all of the fields embraced in the most comprehensive modern laboratory. Such recent innovations as the assay of penicillin in body fluids and the autohemagglutination test for primary atypical pneumonia are included. As a reference book for the technic of methods infrequently used and for the refinement and improvement of routine procedures it should be invaluable in every laboratory dealing with clinical diagnostic problems.

The sections dealing with communicable disease bacteriology suffer to some extent from too great a simplification, for instance there is no discussion of the antigenic analysis of the *Salmonella* or *Shigella* groups; methods for the transportation of material for cultures of *Neisseria gonorrhoeae* are omitted as being unsatisfactory; and no mention is

made of the Vi antigen of *Eberthella typhosa* nor of serum antitoxin titrations for diphtheria immunity.

In addition to the methods of Kolmer and of Boerner for the serodiagnosis of syphilis, the methods of Eagle, Hinton, Kahn, Kline, and Mazzini are described in detail, but no mention is made of the verification tests considered so important by Kahn.

The bacteriological examination of milk and water is covered in two 5 page chapters stated to be adaptations of the methods of the American Public Health Association. However, the section on milk directs pouring plates with nutrient agar of pH 6.6 and incubation at 37° C., failing to mention either T.G.E.M. agar or incubation at 32° C., while the section on water fails to mention liquid confirmatory media, material which has been included in *Standard Methods* for the past several years.

These criticisms are not meant to detract from the general usefulness of the book, especially in the fields designated by Kolmer as clinical pathology and clinical chemistry. It has a definite place in every public health laboratory.

EDMUND K. KLINE

Directory of Social Agencies in the City of New York, 1944–45—*Prepared under the direction of the Committee on Information Services of the Welfare Council. New York: Columbia University Press,* 1944. 366 pp. Price, $4.00.

The 45th edition of this directory has recently been issued under the auspices of the Welfare Council of New York. Started in 1883 by the Charity Organization Society when this society was the social work pioneer in the city, it was taken over by the Welfare Council as a coöperative undertaking by all social agencies of the city in 1935. Since then the *Directory* has been published biennially. It has a wide usefulness, the agencies being listed both alphabetically and in classified sections in relation to type of service given. National agencies with headquarters in the city are included as well as local agencies. Appended also is a list of directories useful to the social worker.

Because of the paper shortage the alphabetical listing of executives of social agencies, hitherto included, is omitted in this edition.

Provision is made for keeping the information in the *Directory* currently up-to-date by publishing changes of personnel, addresses, and telephone numbers in *Better Times,* the weekly publication of the Welfare Council.

MARTHA LUGINBUHL

School's Out. Child Care Through Play Schools—*By Clara Lambert. New York: Harper,* 1944. 225 pp., illus. Price, $2.50.

Anyone who has watched the "Play Schools" in action or who has watched the development of the work of the association which promotes them throughout the nation will be particularly interested in seeing this volume and having it to pass along. For the book is full of facts, sketches of equipment, helpful suggestions for children's activities, for training staff, for working with parents. Those who must plan for those after-school hours when many children today have no backyard where mother keeps a watchful eye, will find much in these pages to help them —and learn of successful ventures in many parts of the country. But those who do not need to plan for such activities can learn much from this book about what children from 5 to 14 are like, what play means to them, what play can do for them, and how to let them play.

LEONA BAUMGARTNER

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Something Not To Crow about—In 1943 there were 389 outbreaks of water, milk, or food-borne diseases affecting 23,665 victims.

ANON. Outbreaks of Disease in the United States during 1943 Transmitted by Water, Milk, and Milk Products, and Other Foods. Pub. Health Rep. 60, 18:485 (May 4), 1945.

What To Do To Be Saved—Though this exhortation is addressed to nurses, there is scarcely a word in it that you can't apply to your own particular job. The exhorter, who knows his business, says in effect, "Many of you think the problems that face your profession, particularly the negative attitude of the public toward you, can be solved by putting pieces and pictures about you in the papers, and having radio commentators say nice things about you. "Public relations," he adds, "is not that kind of magic."

BERNAYS, E. L. A Public Relations Viewpoint. Am. J. Nurs. 45, 5:351 (May), 1945.

Centennial—In the sixth year of her reign (1843), Queen Victoria appointed a commission to inquire "into the present state . . . of the public health and the condition of the poorer classes. . . ." The excerpts from these two reports of the insanitary conditions unearthed in the "large towns and populous districts" will provide you with many a fine quotation for future orations.

DAVIES, T. A. L. One Hundred Years of Public Health. Pub. Health. 58, 7:75 (Apr.), 1945; (and) WHITEHEAD, H. C. One Hundred Years' Progress in Sanitation in Great Britain. J. Roy. San. Inst. 65, 2:65 (Apr.), 1945.

Especially When Faces Are Bitten—Animal experiments warrant a trial of immune serum and vaccine in the prophylaxis of rabies in man. It seems reasonable to assume that the serum may prevent the passage of the virus from nerve cell to nerve cell.

HABEL, K. Seroprophylaxis in Experimental Rabies. Pub. Health Rep. 60, 20:545 (May 18), 1945.

For Industrial Workers—For fifty cents a week the workers in the Kaiser shipyards get comprehensive coverage for non-industrial accidents and illnesses. Family memberships are gradually being made available. In January, 1943, only 62 per cent of the members had joined the plan. In August, 1944, more than 92 per cent had signed up. Health and disease prevention are stressed.

KUH, C. The Permanente Health Plan. Indust. Med. 14, 4:261 (Apr.), 1945.

Foetal Erythroblastosis—Here is one city health department laboratory which performs Rh factor determinations on antepartum blood specimens. The Maternal Welfare Committee of the County Medical Society asked for the service and the community's obstetricians are pleased with it.

LEE, F. P., *et al.* The Rh Factor and the Public Health Laboratory. J.A.M.A. 128, 1:19 (May 5), 1945.

"Health for the American People"—You must read the Surgeon General's address at the dedication of the Health Institute of the United Automobile Workers, CIO. Briefly, the six goals of a comprehensive national health program are outlined. "We cannot attain these goals by talking about them," he reminded his audience.

"We must plan, and if necessary, fight for them."

PARRAN, T. Over the Horizon in Public Health. Pub. Health Rep. 60, 17:457 (Apr. 27), 1945.

Research's Forgotten Man—Ten years ago the Tice Laboratory and Clinic set about determining whether BCG is safe and, vaccination with it, beneficial. "It may be concluded," summarizes the report, "that in the first seven years of life BCG vaccination is of definite value in the prevention of tuberculosis."

ROSENTHAL, S. R., *et al.* Ten Years' Experience with BCG (experimental and clinical). J. Pediat. 26, 5:470 (May), 1945.

Cross and/or Shield—Four types of relationship exist between medical and hospital plans, varying from no, to complete, coördination between the services for the 16,000,000 who buy prepaid hospital care and the 1,800,000 who purchase some form of prepaid medical care.

REED, L. S., and VAUGHN, H. F., JR. The Coördination of Medical and Blue Cross Plans. J.A.M.A. 128, 1:22 (May 5), 1945.

After-thoughts on Polio—Though this paper is largely medicine, and not hygiene, there is some excellent discussion of the natural history of poliomyelitis which should interest all public health workers. Also there is an objective discussion of Sister Kenny's contribution to the treatment of the disease that should help clear away the effects of some of the ill-tempered noise that we've heard from both camps.

STIMSON, P. M. Treatment of Poliomyelitis. New York State J. Med. 45, 7:744 (Apr.), 1945.

The Second Horseman—After the cessation of hostilities in World War I, typhus, relapsing fever, cholera, smallpox, malaria, dysentery, and typhoid swept across Europe. Conditions propitious for epidemics exist now and are likely to grow worse. Louse-borne typhus is the gravest danger, with three main epidemic foci. But other diseases threaten, too. UNRRA's Epidemiologic Information Bulletin will publish later accounts of the status of the epidemic diseases.

STOUMAN, K. The Epidemic Outlook in Europe. J.A.M.A. 128, 3:185 (May 19), 1945.

More Guns — and Butter—Services rendered by 47 state industrial health units employing a total professional personnel of 300 make an impressive total. They included inspections and surveys of industrial hazards, recommendations for improvements involving many thousands of laboratory tests and physical examinations.

TRASKO, V. M. Official Industrial Hygiene Services. Indust. Med. 14, 4:277 (Apr.), 1945.

BOOKS RECEIVED

ANTECEDENTS OF THE NATIONAL TUBERCULOSIS ASSOCIATION. By Robert G. Paterson, Ph.D. New York: National Tuberculosis Association, 1945. Historical Series No. 2. 25 pp. Price, $.25.

THE AUTOBIOGRAPHY OF SCIENCE. Edited by Forest Ray Moulton and Justus J. Schifferes. Garden City: Doubleday, Doran, 1945. 666 pp. Price, $4.00.

BIBLIOGRAPHY OF THE PUBLISHED WRITINGS OF SIGISMUND SCHULTZ GOLDWATER, M.D. Compiled by the Bacon Library of the American Hospital Association. Chicago: American Hospital Association. 15 pp. Free from The Bacon Library, 18 East Division St., Chicago 10, Ill.

CAMPING FOR CRIPPLED CHILDREN. Edited by Harry H. Howett. Elyria: The National Society for Crippled Children and Adults, Inc., 1945. 120 pp. Price, $1.00.

DIAGNOSTIC PROCEDURES AND REAGENTS. Technics for the Laboratory Diagnosis and Control of the Communicable Diseases. American Public Health Association. 2nd

ed. New York: American Public Health Association, 1945. 549 pp. Price, $4.00.

THE DIETARY OF HEALTH AND DISEASE. By Gertrude I. Thomas. 4th ed. Philadelphia: Lea & Febiger, 1945. 308 pp., illus. Price, $3.50.

ENGINEERING PREVIEW. An Introduction to Engineering Including the Necessary Review of Science and Mathematics. By L. E. Grinter, Harry N. Holmes, H. C. Spencer, Rufus Oldenburger, Charles Harris, R. G. Kloeffler, and V. M. Faires. Home Study Edition. New York: Macmillan, 1945. 619 pp. Price, $6.00.

ESSENTIALS OF BODY MECHANICS IN HEALTH AND DISEASE. By Joel E. Goldthwait, M.D., Lloyd T. Brown, M.D., Loring T. Swaim, M.D., and John G. Kuhns, M.D. 4th ed. Philadelphia: Lippincott, 1945. 316 pp., 128 illus. Price, $5.00.

FOOD FOR THE WORLD. Edited by Theodore W. Schultz. Chicago: University of Chicago Press, 1945. 353 pp. Price, $3.75.

HEALTH CARE FOR AMERICANS. By C.-E. A. Winslow, Dr.P.H. New York: Public Affairs Committee, 1945. No. 104. 32 pp. Price, $.10.

HEALTH SECURITY IN POSTWAR AMERICA. Summaries of Papers of the Second Wartime Conference on Labor Health Security. By the Health Council Institute Staff. New York: Health Council Institute for Labor Education and Research, 1945. 84 pp.

HEALTH TEXT-WORKBOOK. An Orientation Course in Personal, Racial, Home and Community Hygiene. By Kathleen Wilkinson Wootten. 4th ed. New York: Barnes, 1944. 212 pp. Price, $1.50.

JURISPRUDENCE FOR NURSES. Legal Knowledge Bearing Upon Acts and Relationships Involved in the Practice of Nursing. By Carl Scheffel, M.D., in collaboration with Eleanor McGarvah, R.N. 3rd ed. New York: Lakeside Publishing Co., 1945. 264 pp. Price, $3.00.

THE MALE HORMONE. By Paul de Kruif. New York: Harcourt, Brace, 1945. 243 pp. Price, $2.50.

MEDICAL CARE AND HEALTH SERVICES FOR RURAL PEOPLE. A Study Prepared as a Result of a Conference Held at Chicago, Illinois, April 11–13, 1944, Sponsored by the Farm Foundation. Chicago: Farm Foundation, 1944. 226 pp. Price, $1.00.

MEDICAL CARE OF MERCHANT SEAMEN. A Handbook of Ship and Aircraft Sanitation and Emergency Medical Aid. By W. L. Wheeler, Jr., M.D. New York: Cornell Maritime Press, 1945. 212 pp. Price, $2.00.

A MILLION HOMES A YEAR. By Dorothy Rosenman. New York: Harcourt, Brace, 1945. 333 pp. Price, $3.50.

NATIONAL HEALTH AGENCIES. A Survey With Especial Reference to Voluntary Associations. By Harold M. Cavins. Washington, D. C.: Public Affairs Press, 1945. 251 pp. Price, $3.00.

PERSONNEL WORK IN SCHOOLS OF NURSING. By Frances Oralind Triggs, Ph.D. Philadelphia: Saunders, 1945. 237 pp. Price, $2.75.

THE PSYCHOLOGY OF WOMEN. A Psychoanalytic Interpretation. By Helene Deutsch, M.D. Volume 2, Motherhood. New York: Grune & Stratton, 1945. 506 pp. Price, $5.00.

PUBLIC MEDICAL CARE. Principles and Problems. By Franz Goldmann, M.D. New York: Columbia University Press, 1945. 226 pp. Price, $2.75.

REPORT OF THE CONFERENCE ON THE PROBLEMS OF MEDICAL CARE, WASHINGTON, D. C., DECEMBER 8–9, 1944. New York: Physicians Forum, Inc. 47 pp.

THE ROCKEFELLER FOUNDATION. A REVIEW FOR 1944. By Raymond B. Fosdick. New York: Rockefeller Foundation. 63 pp. Free from publisher, 49 W. 49th St., New York, N. Y.

SOCIOLOGY APPLIED TO NURSING. By Emory S. Bogardus, Ph.D., and Alice B. Brethorst, Ph.D. 2nd ed. Philadelphia: Saunders, 1945. 312 pp. 27 illus. Price, $2.50.

SWIMMING POOL DATA AND REFERENCE ANNUAL. 13th ed. New York: Hoffman-Harris, Inc., 1945. 110 pp. Price, $3.00.

WHAT TO DO ABOUT VITAMINS. By Roger J. Williams. Norman: University of Oklahoma Press, 1945. 56 pp. Price, $1.00.

WISCONSIN HANDBOOK ON HEALTH FOR THE ELEMENTARY TEACHER. By the Wisconsin Coöperative School Health Program. Madison: Bureau of Maternal & Child Health, State Board of Health, 1944. 109 pp.

YOUR HAIR AND ITS CARE. By Oscar L. Levin, M.D., and Howard T. Behrman, M.D. New York: Emerson Books, 1945. 184 pp., illus. Price, $2.00.

SCIENCE TODAY AND TOMORROW. By Waldemar Kaempffert. 2nd series. New York: Viking, 1945. 279 pp. Price, $2.75.

VITAL STATISTICS DIRECTORY. Compiled by the Vital Statistics Section of the American Public Health Association. 3rd ed. New York: American Public Health Association, 1945. 33 pp. Price, $.75.

ASSOCIATION NEWS

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Lt. Col. C. Earl Albrecht, M.C., Fort Richardson, Palmer, Alaska, Commanding Officer and Post Surgeon

Clodoveo Alcivar, M.D., Clinica Guayaquil, Guayaquil, Ecuador, S. A., Vice-Director, Instituto Nacional de Higiene.

Richard W. Garnett, M.D., Health Office, Danville, Va., Director, Danville Health Dept.

Frank M. Hall, M.D., M.P.H., Box 491, Gainesville, Fla., Director, Alachua County Health Dept.

Elmer L. Hill, M.D., 41 Exchange Place, Typhus Control Unit, Atlanta, Ga., Passed Asst. Surgeon, U. S. Public Health Service

Antonio Langis, M.D., D.P.H., Ste. Martine, Chateauguay County, P. Q., Canada, Health Officer

John W. McClane, M.D., P. O. Box 494, Fernandina, Fla., Director, Nassau-Baker Health Unit

Norman C. Parfit, D.T.M., D.P.H., Causeway Cottage, Much Hadham, Herts, England, Acting Head, Dept. of Public Health, West China Union Univ. (on leave)

Ernest R. Pike, M.D., East Woodstock, Conn., Health Officer

J. Lyle Spelmann, M.D., 2410 H. St., Modesto, Calif., Health Officer, Stanislaus County Health Dept.

Harley J. Stacey, M.D., 510½ Delaware St., Leavenworth, Kan., County Health Officer and Director, Venereal Disease Control

Smith L. Turner, M.D., Williston, Fla., Director, Levy County Health Unit

J. Harvey Venning, 23 Church St., Greer, S. C., Health Officer, Greer Health Zone

E. M. Watson, M.D., 6 Roberts St., Fargo, N. D., City Health Officer

W. H. Weeks, M.D., P. O. Box 269, Lexington, Miss., Health Director, Holmes County Health Dept.

Major Samuel S. Winter, M.C., 948–16 St., Newport News, Va., Public Health Officer, Hampton Roads Port of Embarkation

William L. Wright, M.D., Bell County Health Dept., Pineville, Ky., Director

Laboratory Section

C. Raymond Bitter, M.A., 839–13th St., Boulder, Colo., Instructor in Bacteriology and Public Hygiene, Univ. of Colorado

Harry E. Bremer, State House, Montpelier, Vt., Supervisor of Creamery Inspection, State Dept. of Agriculture

John H. Brown, V.M.D., 276 W. Market St., Marietta, Pa., Asst. Director of Laboratories, Wyeth Inc.

Robert E. Buchanan, Ph.D., 503 Welch Ave., Ames, Iowa, Head, Dept. of Bacteriology, Iowa State College

Rita Clark, City Laboratory, City Hall, Brockton, Mass., Asst. Bacteriologist

James M. Darlington, Ph.D., 60 N. West End Ave., Lancaster, Pa., Sr. Bacteriologist, Wyeth Inc.

Arnold J. Gelarie, M.D., 52 W. 74th St., New York 23, N. Y., Private Practice

Lt. Thomas H. Hayes, Sn.C., 12th Medical Laboratory, Fort Lewis, Wash., Bacteriologist

Laura G. Jacques, M.D., 105 Pleasant St., Concord, N. H., Director, Division of Diagnostic Laboratories, State Dept. of Health

Goswin Karmann, M.S.P.H., Instituto Butantan, Caixa 65, Sao Paulo, Brazil, S. A., Asst. Chemist, Dept. of Immunology

Francisco Landron, M.S., Ponce de Leon 74, Santurce, Puerto Rico, Bacteriologist, Laboratorio Quimico-Biologico

Lt. Benjamin Mandel, Sn.C., Laboratory Officer, General Hospital

Lt. Harvey L. Moss, Fort Totten, N. Y., Chief of Laboratory and Post Medical Inspector

Ellen R. Nishimoto, Board of Health, Hilo, Hawaii, Biological Laboratory Technician

Charles C. Prouty, M.S., Troy Hall, State College of Washington, Pullman, Wash., Assoc. Dairy Bacteriologist and Asst. Prof. of Bacteriology and Public Health

Benjamin J. Rush, Jr., Rt. No. 3, Box 296, Charleston, S. C., Chief Pharmacist, U. S. N.

Rafael Santiago-Carmona, 216 Ponce de Leon Ave., Santurce, Puerto Rico, Private Practice, Laboratorio Quimico-Clinico

Harry H. Weiser, Ph.D., Dept. of Bact., Ohio State Univ., Columbus 10, O., Asst. Prof. of Bacteriology

Katharine E. Welsh, 527 Nottingham Rd., Baltimore 28, Md., Principal Bacteriologist, City Health Dept.

Lt. John A. Yurchenco, Laboratory Officer, General Hospital

Vital Statistics Section

P. K. Whelpton, Scripps Foundation, Oxford, Ohio, Assoc. Director, Research in Population Problems

Engineering Section

Erdman J. Allen, 323 County-City Bldg., Seattle 4, Wash., Sanitary Engineer, Seattle Water Dept.

H. Fred Baldridge, 720 Locust St., Twin Falls, Idaho, Sanitarian, State Dept. of Public Health

Charles R. Joseph, M.S., Ashford St. No. 9, Guayama, Puerto Rico, Sanitation Officer, Dept. of Health

J. Don Layson, 1710 N. El Dorado St., Stockton 25, Calif., Sanitary Engineer, Naval Supply Annex

Joseph L. Minkin, M.S., 9112 Palmetto St., New Orleans 18, La., Public Health Engineer, U. S. Public Health Service

Peter H. Sakai, M.S.P.H., 3167 Pahoa Ave., Honolulu 41, Hawaii, Sanitary Inspector, Food and Drug Div., Territorial Board of Health

Major John P. Smith, Jr., Sn.C., P. O. Box 152, Balboa Heights, Canal Zone, Sanitary Engineer, Health Dept., The Panama Canal

Industrial Hygiene Section

Frederick T. McDermott, 18 S. Perry St., Pontiac 15, Mich., Industrial Hygiene Engineer, Bureau of Industrial Hygiene, State Dept. of Health

John T. McDermott, 3728 Avondale Ave., St. Louis 20, Mo., Safety Engineer, U. S. Cartridge Co.

Charles J. Menard, 35 Polk St., San Francisco, Calif., Member, Structural Pest Control Board, State of California

William L. Wilson, State Dept. of Health, New Orleans 7, La., Industrial Hygiene Chemist, U. S. Public Health Service

Food and Nutrition Section

Luis A. Blanco, Calle 63A No. 17-29, Bogota, Colombia, S. A., Student of Public Health, Yale Univ.

Joseph Buteau, M.D., Croix Rouge, Port-au-Prince, Haiti, Vice-President

Anna M. Guerriero, 62 Milford St., Hartford, Conn., Case Supervisor, Hartford Dept. of Public Welfare

Santo J. Sorbello, 5311a Magnolia Ave., St. Louis 9, Mo., Sanitary Inspector in charge of Food Handler Training, St. Louis Health Div.

Maternal and Child Health Section

Matthew Arnao, M.D., 162 Atkins Ave., Brooklyn, N. Y., Practicing Physician

Ann Martin, M.D., Children's Hospital, East Bldg., San Francisco, Calif., Director of Child Development Center

Israel Miller, M.D., 1014 Lenox Rd., Brooklyn, N. Y., Supervising Physician, New York City Dept. of Health

Public Health Education Section

Elin L. Anderson, M.A., Farm Foundation, 600 S. Michigan Ave., Chicago 5, Ill., Director, Medical Care and Health Services for Rural People

Prudence Appelman, R.N., Jameson Memorial Hospital, New Castle, Pa., Director of Nursing

Gladyce Bradley, M.A., 922 Woodlawn Ave., Ann Arbor, Mich., Student, Univ. of Mich.

Venerable William F. Bulkley, D.D., 75 P. St., Salt Lake City, Utah, Pres., Utah Social Hygiene Assn., Inc.

George H. Craze, 4th Floor, Court House, San Antonio 5, Tex., Exec. Secy., Bexar County Tuberculosis Assn.

Doris B. Gehrke, 763 Chapel St., New Haven, Conn., Exec. Secy., Employers Tuberculosis Relief Assn.

Mary R. Gillette, 140 Clarendon St., Boston Y.W.C.A., Boston, Mass., Director, Dept. of Health Education

Opal C. Hartline, Ph.D., M.P.H., 209 S. Campbell St., El Paso, Tex., Director of Public Health Education, El Paso City-County Health Unit

Billie Vliet Keefe, 1025 Stahlman Bldg., Nashville 3, Tenn., Exec. Secy., Tennessee Society for Crippled Children Inc.

Janice J. Larner, 138 S. Oak Knoll Ave., Pasadena, Calif., Supervising Medical Social Worker, Los Angeles County Health Dept.

Jo Ann Lewis, 106½ N. 14th St., Herrin, Ill., Health Education Representative, Williamson County Health Dept.

Naomi H. Malkin, 246 West End Ave., New York, N. Y., Student, Yale Univ.

John C. Potkay, Boston Post Road, R. D. No. 2, New London, Conn., Graduate Student, Dept. of Public Health, Yale Univ. School of Medicine

Alberta Quinif, R.N., Box 164, Kittanning, Pa., Exec. Secy., Armstrong County Tuberculosis and Health Society

LaPrele M. Ridd, 504 South 6 West, Brigham, Utah, Interested Citizen

Marion Souza, M.A., Dept. of Education, Baton Rouge, La., Supervisor, School-Community Health Projects, State Dept. of Education

Lois G. Whitley, 525 Morgan St., Joliet, Ill., Health Educator, Will County Health Dept.

Public Health Nursing Section

Mattie Brass, R.N., Box 270, Spencer, Ia., Supervising Nurse, Health District 3

Regine M. Ferguson, 2520 Broadway, Little Rock, Ark., Acting Chief Nurse, City Health Dept.

Helen Fisher, 304 City Hall, Portland, Ore., Supervisor of Nurses, Div. of School Hygiene, Bureau of Health

Kate O. Hyder, M.A., 1336 S. Newberry Ave., Chicago, Ill., Director, Nursing Service, Chicago Maternity Center

Velma G. Long, R.N., 1325 Garfield, Topeka, Kan., Consultant, Kansas State Board of Health

Anna M. Matter, R.N., 907 National Reserve Bldg., Topeka, Kan., Public Health Nurse, Tuberculosis Control Div., State Dept. of Health

Leada L. Neininger, 400 Howard St., Bridgeport, O., District Supervisor of Public Health Nursing, State Health Dept., Charleston, W. Va.

Ruby S. Sandall, Box 231, Tremonton, Utah, Public Health Nurse

Anna C. Scholl, M.N., Jacksonville, Vt., Public Health Nurse, State Dept. of Public Health

Mary G. Woodward, R.N., District Health Office No. 2, Sikeston, Mo., Field Advisory Nurse

Agnes W. Stirling, U. P. & L. Station, Collinston, Utah, Public Health Nurse

Epidemiology Section

Fred C. Bishopp, Ph.D., 8014 Piney Branch Rd., Silver Spring, Md., Asst. Chief of Bureau in charge of Research, Bureau of Entomology and Plant Quarantine, USDA

Mary C. Block, M.D., 1615 N. Broadway, Santa Ana, Calif., Director, Orange County Tuberculosis and Health Assn.

Helen M. Bradley, R.N., 3333 Grand Ave., Apt. 296, Des Moines, Ia., Record Analyst, U. S. Public Health Service

Enrique Figueroa Franqui, M.D., M. Gomez 29, Santa Clara, Cuba, Medico Honorario del Hospital de Maternidad de Sta. Clara y Jefe del Departamento de Medicina Preventiva de la Cruz Roja en Santa Clara

Ensign James R. Patterson, Naval Training Center, Epid. Unit No. 12, Sampson, N. Y.

Major Richard J. Plunkett, M.C., American Embassy, Asuncion, Paraguay, S. A., Chief of Party, Health and Sanitation Division, Institute of Inter-American Affairs

Joseph J. Pokay, 127 N. W. 18th Ave., Miami 35, Fla., Sr. Sanitary Officer, Dade County Health Unit

School Health Section

Helen S. Austin, 3131 Pasadena Ave., Los Angeles 31, Calif., Assoc. Medical Secy., Southern California Conference of Seventh Day Adventists

Edna M. Blochberger, 17 East 53 Terrace, Kansas City 2, Mo., Staff Nurse, Board of Education

Gertrude T. Huberty, M.D., 405 Hilgard Ave., Los Angeles 24, Calif., Physician for Women, Univ. of California

Byron N. Lingeman, M.D., 419 Ben Hur Bldg., Crawfordville, Ind., School Physician

Nancy E. Lutz, 1206 Greenridge Rd., Jacksonville 7, Fla., Consultant in Health Education, Board of Public Instruction

Rosanna N. McKenney, M.D., 804 Elm St., Winnetka, Ill., School Physician

W. Tate Robinson, P. O. Box 2360, Honolulu 4, Hawaii, Director of Health Education, Dept. of Public Instruction

Gladys Simonds, M.A., 1618 Watava Rd., Toledo, O., Teacher, Harvard School

Lloyd L. Tate, M.D., 1520 S. Grand, St. Louis, Mo., Director of Health and Hygiene, St. Louis Public Schools

Elizabeth D. Thomas, R.N., B.S. in N.Ed., 413 N. Walnut St., West Chester, Pa., School Nurse, The Chester County Schools

Delpha H. White, R.N., Pine Haven, Park Rapids, Minn., School Nurse, Park Rapids Public Schools

Dental Health Section

W. L. Beal,, D.D.S., Anaconda, Mont., Chairman, Montana Council on Dental Health

Jose M. Gonzalez-Cepeda, D.D.S., 197 Ponce de Leon Ave., Santurce, Puerto Rico, Dental Service Dept., City of San Juan

Norman F. Johnson, D.D.S., Rutland, Vt., Practice of Dentistry

Joseph H. Kauffmann, D.D.S., 27 E. 95th St., New York 28, N. Y., Dentist

Dr. Bruce Kurtz, 627–1st Trust Bldg., Pasadena 1, Calif., Chairman, Council on Dental Health, Southern Calif. State Dental Assn.

Unaffiliated

Dr. Anibal Ardila-Duran, National Box 2977, Bogota, Colombia, S. A., Visiting Doctor to the Dept. of Coordinating Services of

National Hygiene, Ministry of Work, Hygiene and Social Welfare

LaRue O. Ence, 665 Browning Ave., Salt Lake City 5, Utah, Secy., Div. of Industrial Hygiene, State Dept. of Health

Earl H. Fewell, Dispensary, Navy Yard, Philadelphia, Pa., Sanitary Inspector

Sylvia Heymann, M.D., M.S.P.H., 1388 Tuckerman St., N.W., Washington 11, D. C., Medical Officer, U. S. Civil Service Commission

Luisa Iglesias de Jesus, M.A., Cruz 21, Apt. A1, San Juan, Puerto Rico, Medical Social Work Supervisor, Bureau of Medical Social Service, Insular Health Dept.

Charles K. Petter, M.D., 2400 Belvidere St., Waukegan, Ill., Superintendent and Medical Director, Lake County Tuberculosis Sanatorium

Margaret M. Wilson, 797 N. Van Buren St., Milwaukee 2, Wis., Secy., Health Div., Milwaukee County Community Fund and Council of Social Agencies

DECEASED MEMBERS

George R. Bedinger, M.A., Plainfield, N. J., Elected Member 1943, Public Health Education Section

Joseph H. Humphrey, M.D., St. Louis, Mo., Elected Member 1925, Maternal and Child Health Section

James B. Vaughn, M.D., Castlewood, S. D., Elected Member 1934, Health Officers Section

Stafford M. Wheeler, M.D., Bethesda, Md., Elected Member 1939, Elected Fellow 1942, Epidemiology Section

WANTED: BACK ISSUES OF THE AMERICAN JOURNAL OF PUBLIC HEALTH

Again the Central Office is sending out an SOS for *Journals* that are out of stock and which are especially needed now to complete sets for the countries that have been occupied and which now are requesting help in rebuilding their technical libraries. The *Journals* that can be used for this purpose are listed below:

1941—January, April, July, August
1942—January, March
1943—January, March, August, September, October, November, December
1944—June, August
1945—January, February, March, April

Members who can return any of the above *Journals* to the A.P.H.A. are requested to do so collect.

AMERICAN PUBLIC HEALTH ASSOCIATION

Statement of Financial Condition as of December 31, 1944

GENERAL FUND

Assets			
Cash—Treasurer's, Secretary's and Emergency Accounts		$61,108.03	
Accounts Receivable—Sales of Publications, Advertising		4,539.15	
Inventories—Publications, Paper for Journal		2,182.74	
Advanced on Travel, Postage and Petty Cash		1,456.98	
Investment Securities (Book value)		24,782.21	
TOTAL GENEIAL FUND ASSETS			$94,069.11
Liabilities			
Accounts Payable		$ 5,600.25	
Accrued Expenses and Federal Withholding Tax		3,115.00	
Reserves			
Doubtful Accounts Receivable	$ 110.87		
Rebates to Affiliated Societies	3,739.50		
Unexpended Balances on Grants	10,136.45		
Equipment and Repair Reserve	1,712.30		
		15,699.12	
Prepaid Income			
Membership Dues—1945	$20,565.96		
Subscriptions to Journal	7,059.16		
		27,625.12	
TOTAL GENERAL FUND LIABILITIES			$52,039.49
Net Asset Value—General Fund			$42,029.62
Net Asset Value—Endowment Fund			9,796.50
Net Asset Value—Life Membership Fund			22,787.50
Net Asset Value—Sedgwick Medal Fund			1,290.14
TOTAL NET ASSET VALUE as of December 31, 1944			$75,903.76

Statement of Income and Expense for the Year Ended December 31, 1944

Income		
Membership Dues	$ 54,007.23	
American Journal of Public Health	39,827.82	
Publications	16,094.55	
Annual Meeting	17,764.50	
Field Surveys	3,707.77	
Miscellaneous	4,035.05	
Grants: Special Activities	74,953.99	
TOTAL INCOME		$210,390.91
Expenses		
General Services	$ 38,558.45	
Promotion and Extension	11,692.21	
Membership and Subscriptions	12,633.23	
American Journal of Public Health	33,017.96	
Publications	14,633.51	
Annual Meeting	7,357.37	
Standing Committees and Special Activities	85,460.79	
TOTAL EXPENSES		$203,353.52

In my opinion, the above fairly presents the financial condition of the Association at December 31, 1944, and the results of the operations for the year ended on that date.

(Signed) FREDERICK FISCHER, JR.
Certified Public Accountant

EMPLOYMENT SERVICE

The Association Employment Service seeks to bring to the attention of appointing officers the names of qualified public health personnel and to act as a clearinghouse on employment. This is a service of the Association conducted without expense to the employer or employee.

From the registry of persons available, selected announcements are published from time to time. Appointing officers may obtain lists of all registrants on request.

Address all correspondence to the Employment Service, American Public Health Association, 1790 Broadway, New York 19, N. Y.

Positions Available

(Supplemental to lists in recent Journals)

Wanted: Two engineers for Industrial Hygiene Service of Tennessee. Four different starting salaries between $2,364 and $3,900 depending on training and experience. Car furnished. Positions permanent. Opportunity for advancement. Apply Dr. R. H. Hutchinson, Commissioner of Health, Nashville 3, Tenn.

Wanted: Physician, Division of Child Hygiene, Ohio Dept. of Health. Salary $4,200. Must be graduate of approved medical school, have 1 year's internship and at least 1 year graduate training, plus 1 year of training or experience in clinical pediatrics or obstetrics. Experience in maternal and child health desirable. Must be licensed in Ohio or eligible for licensure. Apply Chief of Division of Child Hygiene, Dept. of Health, State Departments Bldg., Columbus 15, Ohio.

Positions open: District and County Health Officers in Florida. Medical degree required. Write or wire Merit System Supervisor, State Board of Health, Gainesville, Fla., for complete information.

Physician wanted: Public health pediatrics and epidemiology in large California County Health Department. Major duties consist of infant and preschool health conferences, school examinations, and epidemiology. Beginning salary $455 per month, plus travel allowance, and one meal a day. California license required. Training, experience in pediatrics or public health desirable. Immediately available. Apply William C. Buss, M.D., Kern Co. Health Dept., Bakersfield, Calif.

Bureau of Tuberculosis, Board of Health, Territory of Hawaii, seeks Biometrician or Statistician. Position will probably be classified under Territorial Civil Service as CAF-8 with salary of $244.59 plus wartime bonus of $50 and yearly increment of about $192 up to 5 years. Bureau of Tuberculosis is also looking for young physician experienced in tuberculosis work to have immediate charge of active case finding survey program now under way. This position classified under Territorial Civil Service as P-5 with salary of $416.67 plus $50 wartime bonus and yearly increment of about $250 up to 5 years. Apply Robert H. Marks, M.D., Director, Bureau of Tuberculosis, Territorial Board of Health, Honolulu, T.H.

Wanted: Bacteriologist with B.S. or M.S. degree, preferably male, to teach student nurses, 45 hour course twice a year, to assist with teaching of second year medical students and do general laboratory work. Salary $2,000 with option of complete maintenance for $25 per month. Apply Dr. R. J. Schenken, Director, Dept. of Pathology and Bacteriology, Louisiana State University School of Medicine, New Orleans 13, La.

Wanted: Physician to assume directorship, Bureau of Venereal Diseases, in eastern city of 185,000 population. Permanent position. Minimum salary $4,657, maximum $5,197.37, includes cost of living adjustment. Travel allowance. Apply **Box J,** Employment Service, A.P.H.A.

Sanitary Engineering positions open with Oregon State Board of Health. Associate engineer $275–$325; assistant engineer $250–$300. Engineering degree and professional experience required. Sanitarians also needed, salary $225–$275. Applications and further information obtainable from the Merit System Council, 616 Mead Bldg., Portland 4, Ore. Apply by August 1.

Excellent opportunities, permanent tenure, for doctors, dentists, nurses, technicians with the Oregon State Board of Health in specialized fields. For information write Merit System Council, 616 Mead Bldg., Portland 4, Ore.

Wanted: Laboratory worker, must have at least B.S. degree, for general bacteriological, microscopic and chemical

work (permanent) in laboratory specializing in dairy, food, and bactericide control. Detail training, experience, availability, salary required and references; also send personal data and recent photograph. New Jersey Dairy Laboratories, 222–226 Easton Ave., New Brunswick, N. J.

Wanted: Immediately: Veterinarian for Columbia County Department of Health. Salary—maximum $3,600 per year plus automobile and up-keep. Veterinarian must be licensed in New York State. Address Dr. Sue H. Thompson, 612 Warren Street, Hudson, N. Y. Position for the duration of the war.

Wanted: Sanitarian and dairy inspector for field work. Salary $2,400 per year plus $5 per day for living expenses. Auto with gasoline and all other expenses furnished. Apply E. J. Ward, Commissioner of Agriculture, State Dept. of Agriculture, Cheyenne, Wyoming.

Wanted: City Health Services director for city health department in California, city of 100,000 population. Pediatrician or public health trained physician to administer program, serve as clinician in child health conferences and supervise nursery school health program. Salary up to $6,300 per annum, plus travel. Send complete details and photograph to **Box I,** Employment Service, A.P.H.A.

Wanted: Public health officer in well established health department in county of 68,000 population. Salary $5,500. Apply Floyd O. Prunty, Chairman, Marion Co. Lay Health Committee, 300 Second St., Fairmont, W. Va.

Executive Secretary Wanted. Applicant must have some specialized training and experience in health education. Executive experience desirable. Salary $3,000 up, depending upon qualifications. Car furnished. Apply with full information to A. C. Martin, M.D., Nassau Co. Cancer Committee, 1551 Franklin Ave., Mineola, N. Y.

POSITIONS WANTED

Health educator, Ph.D., Harvard, with training in medical science, public health and education, experienced as teacher, seeks position in Northeastern United States. **H-512**

Health educator, Master of Science in Public Health Education, with experience in visual aids, would like position with private agency in Southwest or Central West. **H-514**

[END OF A.P.H.A. LISTING]

Opportunities Available

Advertisement

WANTED—(a) Physician with tuberculosis or administrative experience in public health work; position chiefly concerned with administration and statewide tuberculosis control program; East. (b) Physician to engage in public health pediatrics with epidemiology; major duties consist of infant and preschool health conferences, school examinations, and epidemiology; county health department, headquarters in town of 80,000 located approximately midway between Los Angeles and San Francisco. (c) Director of student health; state university; approximately 1,800 students, 172 faculty; well equipped infirmary given to university as special gift; East. (d) Young woman physician for student health appointment; competent medical clinician interested in student health work as career required; duties include responsibilities for preventive and acute medicine as well as for hygiene and public health lecturing; Middle West. (e) Public health physician to direct county health department; well equipped department, staff of twelve assistants; progressive program having support of entire community; town of 30,000; Southeast. (f) Assistant director of school health work; school population approximately 62,000 in 72 public schools; Southwest. **PH7-1** The Medical Bureau, Burneice Larson, Director, Palmolive Building, Chicago 11.

WANTED—(a) Several dentists for publlic health appointments in South; would be assigned to one or more counties to provide dental care for indigent children and prenatal patients. (b) Two dentists, department of health, public schools, town of 100,000; Middle West. **PH7-2** The Medical Bureau, Burneice Larson, Director, Palmolive Building, Chicago 11.

WANTED—(a) Assistant professor, department of bacteriology and public health, state college; bacteriologist with Ph.D. or D.P.H. degree and with research interests in acceptable field required; Pacific Coast. (b) Associate bacteriologist for research in milk and food sanitation; duties include field activities in the various parts of the country conferring with state and municipal authorities; headquarters in Middle West. (c) Bacteriologist; administrative appointment, department of public health; must be qualified to do original research as well as to supervise investigative work; East. **PH7-3** The Medical

Bureau, Burneice Larson, Director, Palmolive Building, Chicago 11.

WANTED—(a) Vital statistician; bachelor's degree with year of professional graduate training leading to master's degree or Certificate in Public Health with specialization in general and public health statistics preferred; large industrial project; South. (b) Health educator; state tuberculosis association; $2,800–$3,000; East. (c) Social research analyst; state-wide program for physically handicapped children; several years' supervisory experience in conduct of public health or public welfare statistical research activities required; Middle West. **PH7-4** The Medical Bureau, Burneice Larson, Director, Palmolive Building, Chicago 11.

WANTED—(a) Nutritionist and, also, nutrition consultant; public health program recently inaugurated in one of the United States dependencies; considerable traveling; salaries $225–$255 and $275–$320 respectively. (b) Public health nutritionist; city department of health; South. **PH7-5** The Medical Bureau, Burneice Larson, Director, Palmolive Building, Chicago 11.

WANTED—(a) Orthopedic nursing consultant; duties consist of supervising public health nursing and orthopedic nursing; state-wide program for physically handicapped children; Middle West. (b) Public health supervisor; county health department having national recognition for its public health achievements; staff of ten nurses; $2,800. (c) College nurse, experienced in student health work; duties comparatively light, permitting nurse to continue studies; Pacific Northwest. (d) Public health nurse particularly interested in maternity and child health; interesting supervisory appointment with maternity center now being inaugurated by university. (e) College nurse qualified in laboratory work and, also, qualified to teach biology and chemistry; coeducational college expecting detachment of Army for training; duties, therefore, include serving as nurse to Army unit; town of 30,000 not far from Chicago. (f) Instructor, public health nursing; 500-bed hospital; vicinity, New York City. (g) Several nurses for industrial dispensary; large industrial company; $200; South. **PH7-6** The Medical Bureau, Burneice Larson, Director, Palmolive Building, Chicago 11.

Situations Wanted

Advertisement

YOUNG DENTIST, veteran World War II, is available; B.S. and D.D.S. degrees; two years' successful private practice; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

BACTERIOLOGIST; B.Sc., M.Sc., and D.Sc. degrees; several years, director of research institution; past ten years, bacteriologist and epidemiologist large organization, during which time he served as associate professor of bacteriology and immunology; for further information covering qualifications including bibliography, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

PUBLIC HEALTH PHYSICIAN is available; Doctor of Medicine and Doctor of Public Health degrees, state university; sixteen years' administrative experience in public health medicine; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

PUBLIC HEALTH NURSE; B.S. degree in education; certificate in public health nursing from state university; several years, public health nursing with state department; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

NEWS FROM THE FIELD

PUBLIC HEALTH ASSOCIATION OF NEW YORK CITY

"Four Roads of Publlic Health" was the theme of the address of Milton J. Rosenau, M.D., President-elect of the American Public Health Association, guest of honor and chief speaker at the Ninth Annual Meeting of the Public Health Association of New York City on May 17.

At an afternoon session, a Panel was conducted on the fields of public health offering the most fruitful promise of expansion. Participating in the Panel were Arthur I. Blau, M.D., Chairman, Otto A. Bessey, Ph.D., Joseph H. Kinnaman, M.D., Jerome S. Peterson, M.D., John L. Rice, M.D., and Clarence L. Scamman, M.D.

The following officers were elected:

President—Sol Pincus
Vice-Presidents—John L. Rice, M.D., and Helen Crosby
Secretary-Treasurer—Frank Kiernan
To the Executive Board—Leverett D. Bristol, M.D., Thomas D. Dublin, M.D., Marion V. Fegley, R.N., Henry I. Fineberg, M.D., Alma W. Fraas, Charles A. Freck, Louis A. Friedman, M.D., and Jacob A. Goldberg, Ph.D.
Representative to the A.P.H.A. Governing Council—Frank Kiernan

The Association membership is 390.

A message of greeting from the Association was sent to Ernest L. Stebbins, M.D., Health Commissioner, who is on a mission to Europe at the request of the Surgeon General of the U. S. Public Health Service.

OLEOMARGARINE AND THE COUNCIL ON FOODS AND NUTRITION

Misinterpretation is being placed on the action of the Council on Foods and Nutrition of the American Medical Association in withdrawing acceptance from individual brands of oleomargarine. Reports published in the periodicals devoted to the interests of the dairy industry and comment stimulated in the public press falsely attribute this action to a lack of confidence in the nutritional value of margarine. Such is not the case. The report of the Council on Foods and Nutrition in *The Journal*, September 16, 1944, stated clearly that margarine is considered a general purpose food and therefore outside the Council's scope of acceptance, now limited to "special purpose" foods. For this reason acceptance is no longer granted to margarine. Confidence in the nutritional value of margarine fortified with vitamin A was reaffirmed by the Council at the time acceptance was withdrawn. The attempts of those opposing margarine to cast doubt and suspicion on its food value as a result of the withdrawal of acceptance by the Council are unwarranted and misleading. (See *J.A.M.A.*, May 12, 1945.)

AMERICAN SOCIAL HYGIENE ASSOCIATION ESTABLISHES COMMITTEE ON INTER-AMERICAN COÖPERATION

Surgeon General Thomas Parran, Chairman of the General Advisory Committee of the Amercian Social Hygiene Association, has announced the establishment of a section of the committee for the purpose of furthering coöperation with the other American Republics, and to give recognition, consideration and guidance to the association's activities in this direction. Dr. Ray Lyman Wilbur, the association's President, will serve as Chairman, and Miss Jean B. Pinney, Director of the Washington Liaison Office, as Secretary.

It is believed that the establishment

of the new Advisory Commiteee section will help greatly in further exchange of information and in building of additional friendly relations, as well as in extending the scope of the joint effort for better health and stronger family life in which all are concerned.

BIENNIAL CONFERENCE OF THE CANADIAN HOME ECONOMICS ASSOCIATION

The August 27–31 biennial conference of the Canadian Home Economics Association will be held at the Royal Alexandra Hotel, Winnipeg.

DIPHTHERIA IN SAN FRANCISCO—1945

J. C. Geiger, M.D., Director of Health of the City and County of San Francisco, has reported that there definitely is an upward trend in the reported incidence of diphtheria for the first part of 1945. From an average of 10 cases per year for the last four years, the prevalence has risen to 28 cases for the first four months of 1945 with 5 deaths. According to Dr. Geiger, 11 of the 28 cases were from the military forces and 10 were in adults ranging from 24 to 72 years. Very few of the cases have been among children previously immunized against diphtheria and none among children immunized and subsequently Schick-tested.

U. S. INDIAN SERVICE ANNOUNCES SHORT COURSE IN FOOD HANDLING

Dr. Ralph B. Snavely, the Director of Health of the U. S. Indian Service, Chicago, has announced that the Indian Service, in coöperation with the U. S. Public Health Service, will offer a short course of instruction in the sanitary handling of food in kitchens and dining rooms maintained by the Indian Service.

Two-day institutes began late in May in Arizona and will be continued beginning June 1 in Phoenix and in Santa Fe, N. M., Wingate, N. M., and Shiprock, N. M. It is expected that each agency superintendent will detail as delegates a limited number of employees who are responsible for the preparation and serving of food and those responsible for the supervision of this work, including day school personnel, boarding school personnel and hospital and sanatorium personnel.

VENEREAL DISEASE AMONG TROOPS OF THE PANAMA CANAL DEPARTMENT

Success in the fight against venereal disease among the troops of the Panama Canal Department is reflected in the annual report for 1944 recently issued by Col. Wesley C. Cox, Department Surgeon and Venereal Disease Control Officer, which shows a new low rate of 2.09 per cent. This rate is less than one-half of the previous annual low of 4.27 established in 1943 and considerably under one-third of the 6.6 per cent recorded in 1940, the first year in which large scale control campaigns became necessary. Contributing to the 1944 record low was a rate of 1.4 per cent attained in the final month of the year. Reports for the first two months of the present year show a still further decline to a rate of 1.8 per cent, which gives army venereal disease control officers a basis for setting the goal for 1945 at 2 per cent or less.

Brig. Gen. Henry C. Dooling, Chief Health Officer, the Panama Canal, and Surgeon, Caribbean Defense Command, acts as liaison officer between the Army and the civil authorities. Cooperation by the Republic of Panama is under the direction of Dr. Guillermo Paredes, Director of Public Health, who works in liaison with General Dooling.

UNRRA TO SEND TEACHING STAFF TO CHINA

It was announced in May that the United Nations Relief and Rehabilitation Administration would send about

30 medical and health experts to China to train personnel in medical centers. These persons will be recruited from the United States, Great Britain, Australia, and Canada. Governor General Herbert H. Lehman has announced that essential supplies will also be furnished by UNRRA to equip centers in Chungking and Chengtu and later in Kweiyang, Nanking, and Peiping.

NATIONAL HEALTH COUNCIL ELECTION

The National Health Council recently announced the reëlection of Eleanor Brown Merrill as *President* for the coming year. Mrs. Merrill is Executive Director of the National Society for the Prevention of Blindness.

Other officers, who were also re-elected, are: *Vice-President,* Dr. Walter Clarke; *Secretary,* Professor Maurice A. Bigelow; *Treasurer,* Dr. William F. Snow.

The National Health Council, with headquarters at 1790 Broadway, New York, N. Y., is a clearing house of 21 voluntary health organizations. As one of its activities, the Council maintains a library of 6,000 volumes and 30,000 pamphlets dealing with public health and related subjects; more than 500 professional journals and technical periodicals are received regularly from all parts of the world.

BOARDS NAMED FOR NEW HEALTH DEPARTMENTS IN ILLINOIS

Members of the Boards of Health who will be in command of the new Health Departments in Adams and DuPage Counties were recently appointed by the respective County Boards of Supervisors. These two counties were the first in Illinois to establish their own full-time health departments by popular vote, this action having been taken in the November, 1944, election. In compliance with the Searcy-Clabaugh law under which county health departments are established, the membership of each of these County Boards of Health, "chosen for their special fitness for membership on the board," includes two physicians, one dentist, and four other persons. Members of the Adams County Board of Health include Drs. Walter D. Stevenson, Quincy, and Walter E. Davidson, Liberty, and for DuPage County Drs. Carl E. Schultz, Hinsdale, and Arthur S. Webb, Wheaton.

SERVICE BUREAU FOR RETURNING MEDICAL OFFICERS IN CONNECTICUT

The organization of a service bureau for returning medical officers is now under way under the auspices of the Connecticut State Medical Society. It will be located and administered in the offices of the state society at New Haven and the Procurement and Assignment Service. Discharged medical officers will have access through the service bureau to factual data concerning opportunities for general or special practice in urban or rural communities, information regarding full-time institutional, public health and industrial employment, and detailed intelligence on the resumption or extension of education and training. Advice and guidance concerning problems of a local nature will be available to the physician veterans at all times. Connecticut physicians who have already returned from military service will be asked to serve the bureau in an advisory capacity in order that the benefit of their special knowledge and experience may be obtained.

TROPICAL DISEASES

The State University of Iowa College of Medicine, Iowa City, and the State Department of Health, in coöperation with the U. S. Public Health Service, will conduct a special laboratory course in malaria and other tropical diseases at the State Hygienic Laboratory, Iowa City, July 23–28. The instructors will

be Dr. Milford E. Barnes, Professor of Hygiene and Preventive Medicine, and Kenneth MacDonald, Ph.D., Assistant Professor, both of the College of Medicine, and Dr. Irving H. Borts, Director of the State Hygienic Laboratory.

BUREAU OF INDUSTRIAL HYGIENE CREATED IN OHIO

The Cleveland Bureau of Industrial Hygiene has been set up by the local Division of Health to help reduce health hazards in industry. The research and educational facilities of Western Reserve University School of Medicine have been made available to the new bureau, which has established quarters in room 207 at the School of Medicine Building on the university campus, Cleveland. The bureau was established on an order of the Cleveland Welfare Director as a coöperative venture of labor, industry, the medical profession and the public. Herbert G. Dyktor, former Chief Engineer of the Bureau of Industrial Hygiene of the Michigan Department of Health, has been appointed Director. In the immediate future, Mr. Dyktor's staff will consist of two engineers, a chemist, and a secretary.

As a basis for the operation of the bureau, the Division of Health made a survey of 160,000 individuals in Cleveland manufacturing plants to determine their health status and the state of their working environment. The results of the survey have not been tabulated, although some of the more serious industrial health and accident hazards have been found to exist in newer plants that have sprung up since the war, and it is in these plants having fewer than 500 employees where the first work of the bureau will be undertaken. The survey included as one phase the filling out of questionnaires by employees regarding such things as medical examinations to which they have submitted, whether they have been examined for tuberculosis and venereal diseases and whether they were examined by a physician before going to work in their present place of employment. It is expected that much of the work of the new bureau will be educational and advisory. It will help plants in obtaining the services of physicians and nurses and in installing proper safeguards. When necessary, it will use police powers of the Division of Health to enforce proper standards, but emphasis will be placed on lectures, movies, pamphlets, and other educational work.

In a statement to the press, Dr. James a Doull, Professor of Hygiene and Public Health at the medical school, said that medical students will profit by the bureau being situated at the school, and it is hoped that the director of the bureau and members of the staff of the City Division of Health will contribute to instruction of the students. The Bureau of Industrial Hygiene is an outgrowth of the coöperative effort of the Health Subcommittee of the Mayor's War Production Committee, the Anti-Tuberculosis League, the U. S. Public Health Service, the Cleveland Academy of Medicine and Western Reserve University with Dr. Harold J. Knapp, Commissioner of Health of Cleveland.

FIRST HEALTH INSPECTOR GENERAL NAMED FOR SOUTH PACIFIC

Dr. John C. R. Buchanan, formerly Deputy Director for Medical Services in Uganda, has been named the first Health Inspector General of the South Pacific in line with a new plan to create a Pacific Public Health Service planned by the British Empire. According to the *New York Times* the decision to adopt the plan, which envisages joint public health and medical services for Fiji, the British Western Pacific territories and New Zealand Island Territories on Oceania was made in conjunction with London and Wellington. It

followed an investigation of existing services in Fiji by New Zealand officials. The headquarters of the set-up will be located in Suva Fiji, which is conveniently situated for training the necessary personnel and for expansion.

NATIONAL NURSING PLANNING

Pearl McIver, R.N., chief of the Office of Public Health Nursing, Bureau of States Services, U. S. Public Health Service, and chairman of the Council of Federal Nursing Services, is new chairman of the National Nursing Planning Committee of the National Nursing Council for War Service. She takes the place held for a year by Marion W. Sheahan, R.N., Director of the Division of Public Health Nursing, New York State Department of Health, and President of the National Organization for Public Health Nursing, who resigned in May because of the pressure of other duties. Miss Sheahan remains a member of the executive committee.

The Planning Committee, according to the announcement, is making progress in rounding out its composite program for nation-wide study and action aimed at providing "nursing service at a high level of competence for all the people." Work in those areas demanding immediate action is not to be delayed until the entire program is agreed upon. The program will, indeed, more or less continually be in process of evolution, as initial studies and fact-finding activities point to adjustments.

Members of the executive committee, besides Miss McIver and Miss Sheahan, include Agnes Gelinas, R.N., Director of the Skidmore College School of Nursing; Alma C. Haupt, R.N., Director, Nursing Bureau of the Metropolitan Life Insurance Company; Lucile Petry, R.N., Director, Division of Nurse Education, U. S. Public Health Service; Ruth Sleeper, R.N., Assistant Principal of the School of Nursing, Massachusetts General Hospital; and Ruth G. Taylor, R.N., Director, Nursing Unit, Children's Bureau of the U. S. Department of Labor. The Executive Secretary since September, 1944, has been Marjorie B. Davis, R.N., formerly chairman of the Massachusetts Nursing Council for War Service. The Director of Research is Margaret L. Plumley, R.N.

PROGRAM ON HEALTH EDUCATION IN PHILADELPHIA

On May 2, the Philadelphia Department of Public Health launched a concentrated year round educational campaign to improve the health of the citizens of Philadelphia. Attention is to be focused on pertinent facts concerning those diseases which constitute the greatest menace, and the medical schools, local professional groups and allied agencies are coöperating. A steering committee has been set up and the Department of Health will provide speakers and educational material, including sound motion picture films. The first program is devoted to tuberculosis and a slogan chosen to be used throughout the campaign is "Is There Tuberculosis in Your Home? Find Out!" Similar programs will be carried out for rheumatic heart disease, nutrition, child health, diabetes, cancer, venereal disease, labor, industry and industrial medicine, respiratory diseases, clubs, personal hygiene and mental hygiene.

REPORT OF INTERNATIONAL HEALTH DIVISION OF THE ROCKEFELLER FOUNDATION

Chief activities of the Health Commission of the International Health Division of the Rockefeller Foundation in 1944 were louse control studies in Mexico, typhus and malarial control in Italy, malarial work in Egypt, the study of infective jaundice and other infectious diseases, nutrition studies in

England and the manufacture and distribution of yellow fever vaccine. These projects were financed by $1,000,000 earmarked for this emergency work out of the total budget of $3,200,000 for the entire Division. In 1944 attention was concentrated on twelve specific diseases, the most important of which were yellow fever, malaria, typhus, and the deficiencies related to nutrition. Perhaps the most significant contribution of the International Health Division to public health has been in the field of public health education. In 1944 fairly substantial sums were appropriated for fellowships and travel grants and for the support of schools of hygiene and public health nursing and to support nursing schools in Canada, Colombia, Brazil, Ecuador, Argentina, Venezuela, and Portugal. According to the annual report, the Division carried on operations in 23 different countries. In its research program, the report of the Division indicates significance in the discovery of active virus of yellow fever in a sick monkey, a marmoset. The animal was seriously ill and soon died after it had been trapped in June, 1944, by the laboratory at Ilhéus, Brazil. Exhaustive laboratory tests showed conclusively that it had died of yellow fever. The episode is historically interesting, the report points out, because it is the first time in any country that a wild animal has been picked up in its natural habitat suffering from yellow fever and holds support to the thesis that yellow fever is primarily a disease of jungle animals transmitted by "jungle mosquitoes."

INDUSTRIAL HEALTH ENGINEERING IN THE TENNESSEE VALLEY AUTHORITY

The paper "Industrial Health Engineering in the Tunneling Operations of the Tennessee Valley Authority" presented by Frank N. Chirico, P. A. Engr., (R.), U.S.P.H.S., at the joint session of the Engineering and Industrial Hygiene Sections of the American Public Health Association at the 73rd annual meeting in New York on October 4, 1944, is being printed in bulletin form by the Authority and will be released about June 30. The bulletin, complete with photographs and engineering drawings, deals with the control of toxic dusts and gases and exposures to excessive temperature and humidity encountered in the tunneling operations at Ocoee, Apalachia, Fontana, South Holston, and Watauga Dam Construction Projects, located in Tennessee and North Carolina. Engineering methods of control employed, the degree of control achieved, and ventilation rates necessary for eliminating various tunnel hazards, are discussed and presented in the report.

The bulletin is the first of a number of preliminary reports to be issued by the Authority concerning industrial health engineering practices in the construction of dams and tunnels. Inquiries concerning the report should be addressed to the Health and Safety Department, Tennessee Valley Authority, Chattanooga, Tenn.

Correction: On page 667 of the June, 1945, JOURNAL, Gilbert Cottam, M.D., State Superintendent of Health, Pierre, was incorrectly named as State Health Officer of South Carolina. It should have read South Dakota.

PERSONALS

Central States

WILLIAM EDWARD BLAIR, M.D., of Lebanon, Ohio, who has completed 25 years as Health Commissioner of Warren County, has been reappointed for an additional two year term.

DANIEL S. BAUGHMAN, M.D.,† of Madison, S. D., has been appointed

* Fellow A.P.H.A.
† Member A.P.H.A.

Superintendent of the Lake County Board of Health in South Dakota, succeeding CLARENCE E. SHERWOOD, M.D.,† Madison, City Health Officer and member of the State Board of Health.

JOHN R. MCGIBONY, M.D.,† of Chicago, Director of Health, U. S. Office of Indian Affairs, was transferred on April 15 to the Hospital Facilities Section of the U. S. Public Health Service, Washington, D. C., of which DR. VANE M. HOGE is Director. He will be succeeded by DR. RALPH B. SNAVELY,† U. S. Public Health Service, whose recent assignment was District Medical Director of the Indian Service in San Francisco and Albuquerque, N. M.

EDWARD B. MILLER, M.D., has been appointed Health Officer for District Number 2 in Illinois including the Counties of Boone, Lake, and McHenry, with headquarters in Woodstock. Dr. Miller, who was recently in the Medical Corps of the Army of the United States, succeeds DR. FRED O. TONNEY.†

Eastern States

MARY BEARD, R.N., was awarded the honorary degree of Doctor of Laws by Smith College, at the Commencement in May. Miss Beard was recently Director of the Nursing Service of the American Red Cross and formerly Director of Public Health Nursing, International Health Division, Rockefeller Foundation.

BAILEY B. BURRITT,† of New York, N. Y., Executive Secretary of the Health Maintenance Committee of the Community Service Society of New York was recently awarded the Doctor of Laws degree by the University of Rochester, in Rochester, N. Y.

WILLIAM L. HUGHES, PH.D.,* President of the American Association for Health, Physical Education and Recreation, has been named to direct the Physical and Health Education Department of Temple University, Philadelphia, Pa., it was announced by DR. ROBERT L. JOHNSON, President. Dr. Hughes, now a member of the faculty of Columbia University, will begin his new duties September 1. FREDERICK PROSCH, present Temple director, will remain as a full professor at the request of Dr. Hughes.

STANLEY H. OSBORN, M.D.,* of Hartford, Conn., State Health Officer, was recently awarded the honorary degree of Doctor of Public Health by Trinity College in Hartford.

Southern States

JOHN D. BIGGER, M.D., of Swannanoa, N. C., formerly a missionary to Korea, has been appointed Director of Medical Work in the Philippines for all interdenominational agencies, according to the Asheville *Citizen-Times*, March 25, which reported also that the appointment was made by the Committee for Relief in Asia of the Federal Council of the Churches of Christ in America. It was stated that Dr. Bigger's task is to reëstablish medical missions in several of the Philippine Islands as rapidly as possible.

L. E. BURNEY, M.D., New Orleans, La., Medical Director, U. S. Public Health Service, was recently appointed State Health Commissioner in Indiana with headquarters in Indianapolis. Dr. Burney, who is on leave from the Public Health Service, will succeed THURMAN B. RICE, M.D., who has been Acting State Health Commissioner since DR. JOHN W. FERREE was given leave to enter the U. S. Navy.

FRANKLIN L. GEIGER, M.D.,† of Columbia, S. C., Assistant Director of Rural Sanitation, State Board of Health, has been appointed Medical

Director of a tuberculosis survey which is being carried on in South Carolina.

J. M. GOODEN, formerly State School Supervisor, has been chosen State Coördinator of Health Education to inaugurate a program to coördinate and utilize all available services of the state which can contribute to the promotion of better health among Georgians. Mr. Gooden was chosen by a joint committee from the Georgia Department of Public Health, the State Department of Education, and the University System of Georgia. The program will be confined principally in the beginning to a few selected counties where an intensive health program will be developed in the schools and communities, according to *Georgia's Health*. A grant from the W. K. Kellogg Foundation, Battle Creek, Mich., is financing the project. Mr. Gooden's headquarters are with the Georgia Department of Public Health, Atlanta 3.

DON M. GRISWOLD, M.D.,* of Albany, N. Y., Consulting Epidemiologist, New York State Department of Health, is substituting for DR. HUGH R. LEAVELL,* Professor of Public Health and Bacteriology at the University of Louisville School of Medicine, in Kentucky, and is on leave of absence by courtesy of DR. EDWARD S. GODFREY, JR.,* the New York State Commissioner of Public Health. Dr. Leavell is now in the regional headquarters of the UNRRA in London.

FRANK P. HUNTER, M.D., of Warrenton, N. C., has been chosen Health Officer of Warren County.

ROYAL W. WILLIAMS, M.D.,† of Orange-City-County Health Unit, Orange, Tex., has become Acting Director of the County.

CHANGES IN HEALTH OFFICERS IN FLORIDA

FRANK V. CHAPPELL, M.D., Tampa, has been appointed Director of the Hillsborough County Health Department, succeeding CHARLES W. PEASE, M.D., also of Tampa, who was named Epidemiologist of the Department.

KOLBEIN L. K. WAERING, M.D., Jacksonville, Director of the Duval County Department of Health, has resigned.

JOSEPH A. MARKLEY, M.D.,† U.S.P.H.S., has been appointed Health Officer of Duval County, succeeding Dr. Waering.

CHANGES IN HEALTH PERSONNEL IN TEXAS

FREDERICK R. LUMMIS, M.D., Houston, was recently named Chairman of the Houston Board of Health, succeeding EVERETT L. GOAR, M.D., who resigned to devote more time to his activities as Professor of Ophthalmology at the Baylor University College of Medicine, Houston. The following have recently been placed in charge of the health units designated:

DR. WYLY H. HARRIS, Raymondville, of Willacy County.

DR. GUS N. LANCASTER, Granbury, of Hood County.

DR. BYRON L. JORDON, Daisetta, reappointed, of Liberty County.

DR. CLIFFORD G. SWIFT, Cameron, of Milam County.

DR. SAM J. R. ARONSON, Amarillo, of Potter County.

Western States

MILLARD F. SCHAFER, M.D.,† Director of the City-County Health Unit at Colorado Springs, Colo., has been elected President of the Colorado Public Health Association for the ensuing year.

Foreign

JAMES W. BASS, M.D.,* former Director of Public Health of Dallas, Tex., has been promoted to the rank of Colonel in the U. S. Army Medical Corps. He has been responsible for preventive medicine measures in the Southwest Pacific war for more than three years. He was one of the officers who received chief credit for reducing the incidence of malaria in New Guinea by 95 per cent within a few months.

COL. SOHAN L. BHATIA, Deputy Director General of the Indian Medical Service and Dean of the Medical School of the University of Bombay, was a recent visitor to the A.P.H.A. office. Colonel Bhatia was sent by the Indian Government to study methods of administration and organization in various medical schools in the United States. He will aid in the initiation of a public health program in India and will help to found a number of medical schools throughout the country.

DR. RENE SAND of Brussels, Belgium, formerly Minister of Health of Belgium and Belgium's representative to the Health Section of the League of Nations, is now reported to be safe and well after captivity by the Germans. He has returned to Brussels, according to word from the Belgian Embassy in Washington.

Deaths

DANIEL WARREN POOR, M.D., of Narrowsburg, N. Y., died March 29, aged 75. He was associated with the Department of Health of New York City for more than 25 years, retiring in 1929 as Assistant Director of the Bureau of Laboratories.

PAUL AUGUST TESCHNER, M.D., died at his home in Elmhurst, Ill., on May 25, aged 48. He was Assistant Director of the Bureau of Health and Public Instruction of the American Medical Association since 1935 and in this capacity, he lectured before various groups throughout the country and was well known to lay agencies interested in health activities.

JAMES THOMAS WAYSON, M.D., of Honolulu, Hawaii, died January 11, aged 74. He served as Assistant Administrator and Member of the Board of Health of Hawaii and was City and County Physician of Honolulu from 1911 to 1918 and General Health Officer of Hawaii from 1918 to 1931. In 1932, he was instrumental in setting up a separate board of hospitals and settlement to administer the leprosy phase of public health and held the position of Board Physician from the time of its inception until his retirement in 1943.

* Fellow A.P.H.A.
† Member A.P.H.A.

Bactericides *are* different

FREE BULLETIN GIVES PROOF

Free bulletin shows why Diversol . . . with its 10 "action features" . . . is different from ordinary bactericides. A quick-acting, crystal sodium hypochlorite, Diversol helps control bacteria, mold, and yeast. **The Diversey Corporation, 53 W. Jackson Blvd., Chicago 4, Ill.**